WEEDS TREES & TURF

MARCH 1975

Aerial War on Tussocks, Gypsies

Aphid Control

Diagnosing Nematode Problems

Motivating Employees

Turfgrass Show Report

DURSBAN INSECTICIDE

Ornamentals and turf should be seen and not eaten.

That's why DURSBAN* insecticide is the choice of professional turf men for golf greens and fairways. Turf farms. Home and industrial lawns—wherever grass and ornamentals are grown. DURSBAN insecticide is economical, non-phytotoxic and biodegradable. Use it to control ants, chinch bugs, sod webworms, brown dog ticks, cutworms, earwigs, crickets and certain white grubs in turf. For ornamental plants, DURSBAN provides excellent control of aphids, bagworms, grasshoppers, leafhoppers, spittlebugs, mealybugs, mites and cutworms, to name a few. DURSBAN insecticide. For all those who believe ornamentals and turf should be seen and not eaten. Just remember to read and follow all the directions and precautions on the product label. Ag-Organics Department, Midland, Michigan 48640.

DOW

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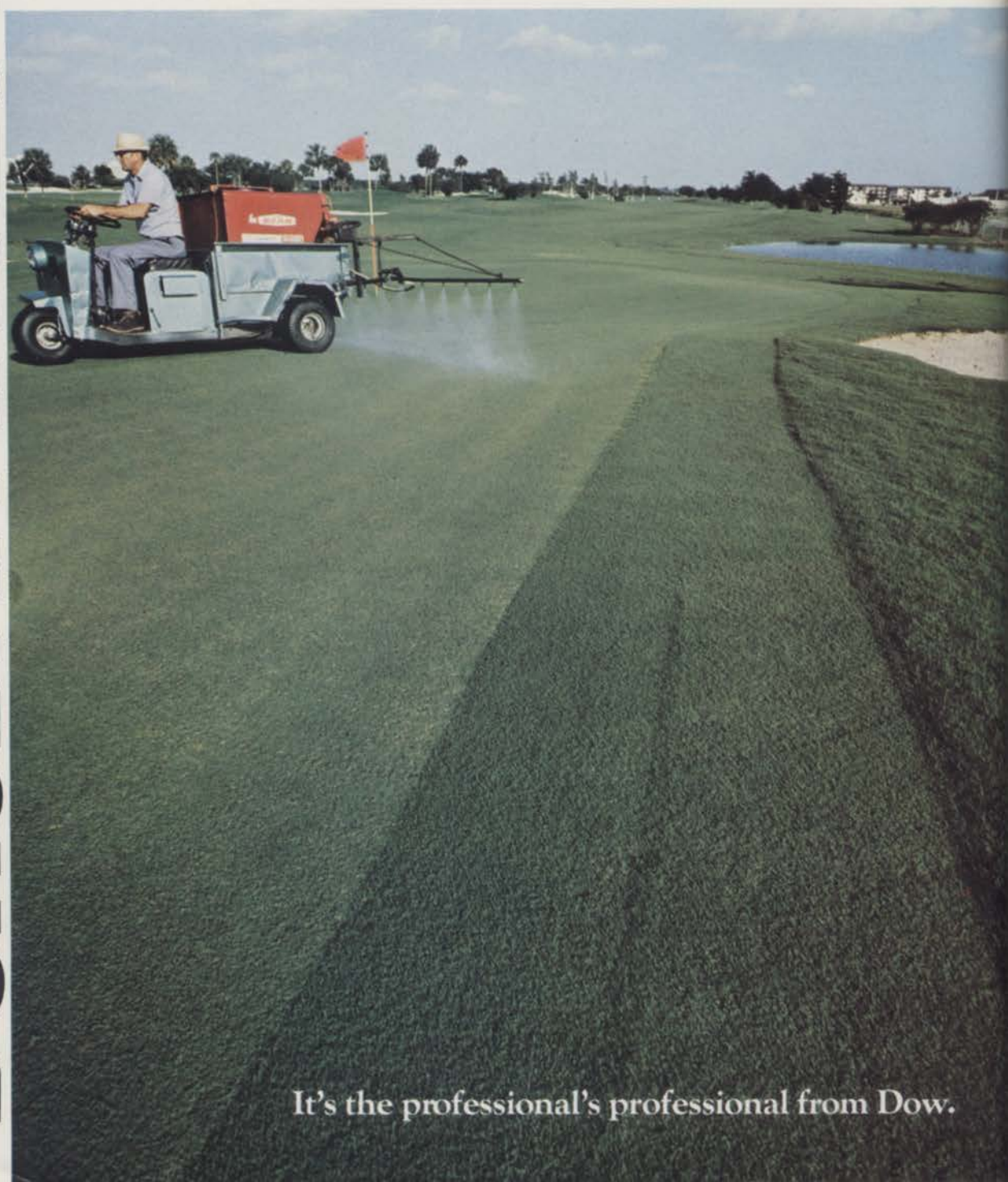

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"Penncross Greens putt true & their even texture gives me confidence in putting."

Patrick C. Fitzsimons

Pat Fitzsimons in winning the Glen Campbell Los Angeles Open at Riviera CC, Calif., Feb. 20-23, set a new course record of 64 for a single round and tied Ben Hogan's course record for this event. Fitz previously tied the world record score of 58 on the 6,000 yard course at Salem Golf Club, Salem, Ore.

For More Details Circle (129) on Reply Card

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You're looking at the most effective arsenal ever assembled to protect your turf.

With this formidable array of armament on your side, you have a broad spectrum turf management program that can ward off just about any attack.

And you can manage it all with surprising economy. Chipco products protect the green of your turf without straining the green in your budget.

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Chipco Turf Herbicide MCPP controls clover, chickweed, knotweed and other surface creeping weeds and is safe and effective for use on most bent grasses.

Chipco Turf Kleen is a broad spectrum herbicide that controls broadleaf and surface creeping weeds with a wide margin of safety around trees and shrubs.

Chipco Spot Kleen is a systemic fungicide for control of dollar spot, Fusarium blight, stripe smut, large brown patch and copper spot.

Chipco Thiram 75 prevents and controls snow mold, large brown patch and dollar spot. Used with Spot Kleen, it offers a complete disease control program.

Chipco Microgreen Liquid provides micronutrients to your turf which results in long lasting deep green color, more root growth and less desiccation.

Chipco Turf Herbicide D is a general purpose broadleaf herbicide ideally suited where economical control is desired.

Chipco Spreader Activator is a superior adjuvant to increase the efficiency and effectiveness of turf chemicals.

Chipco Crab Kleen gives economical and selective post-emergence control of crab grass, chickweed and other grassy weeds in established turf.

Rhodia

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WEEDS TREES & TURF®

March 1975, Vol. 14, No. 3

10 One mistaken notion — Originally introduced to this country under the delusion that it could be crossbred with the silkworm, the gypsy moth has become the Northeast's No. 1 pest and is constantly threatening to invade other regions.

16 Aerial War On Two Fronts: Tussock And Gypsy Moths — In response to two massive insect attacks last summer, a helicopter corps was summoned into active duty. Reinstating their single most effective weapon, DDT, the troops unleashed it against the tussock moth on the Western front. In the East, advancing gypsy moths were temporarily turned back with organic phosphate and biological ammunition.

20 Motivating The Turned-Off Employee: Part III — Motivation — In this last of a three-part series, John L. McKeever discusses the implementation of motivational techniques.

24 GCSAA Show Report — GCSAA held its 46th International Turfgrass Conference in New Orleans in February. Here's a report on what happened.

32 Adelgids: The Aphid Controversy — When is an aphid not an aphid? When it's a pine bark aphid, an eastern spruce gall aphid or a balsam wooly aphid, all of which R. Lee Campbell terms "adelgids," as he explains how this confusing nomenclature can result in costly and futile control attempts.

34 Turfgrass Nematode Problems: Diagnosis and Control — Nematodes can mean double trouble for turfgrass. Not only do they damage root systems, but they might also increase the turf's disease susceptibility. G. W. Bird explains nematode diagnostic procedures and treatment for sod farms, commercial turfs and home lawns.

46 Dollar Spot Control: Integrating Systemics and Contacts — Research has uncovered fungal strains that have become resistant to systemics. Not overlooking the advantages of systemics, P. O. Larsen suggests avoiding systemic fungicide-resistant fungi with a program incorporating systemics and contacts.

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THE COVER — Tussock moths have threatened the northwestern portions of the United States for the past few years. Several control methods have been initiated, one of which was an emergency exemption for the use of DDT in the spring of 1974. (Photo by Dr. Roger Akre, Washington State University.)

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HUGH CHRONISTER
PRESIDENT

ARTHUR V. EDWARDS
PUBLISHER

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DARRELL GILBERT
ADVERTISING PRODUCTION MANAGER
9800 Detroit Ave.
Cleveland, Ohio 44102
(216) 651-5500

ADVERTISING

HEADQUARTERS:
9800 Detroit Ave.
Cleveland, Ohio 44102
(216) 651-5500

JEAN NEUENDORF
EXECUTIVE ASSISTANT

DOROTHY LOWE
CLASSIFIED ADVERTISING MANAGER

RICHARD H. SWANK
REGIONAL MANAGER
9800 Detroit Ave.
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WTT-3

Editorial

Attending a meeting, conference, show or whatever now costs money. For the business operator who includes his associates, the average out-of-state meeting represents a significant business expenditure.

For the exhibitor, the supplier or manufacturer who sets up his product line, mans his booth, and pays the fee for space and accessories, the cost is up even more.

Which produces a situation show sponsors — those associations, societies, universities and other industry groups — cannot ignore. Shows and conferences have to be good. The delegate to the show must get his time and money's worth in terms of information which will help him in his operation. The exhibitor has to see a big percentage of his potential customers.

The '74-'75 winter show and conference season is almost concluded and a critique seems in order.

Our concern is that the two groups requiring satisfaction — the delegates and the exhibitors — have not been as well served in all instances as would seem possible. Thus, both attendance and exhibitor participation suffer.

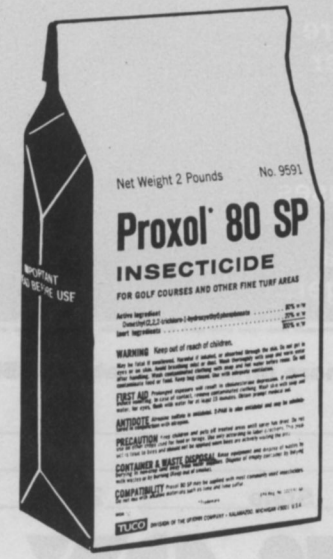
Basically, the problems revolve around the fact that the average association enjoys a membership amounting to only 10%-12% of the universe or the specific industry involved. This limits potential attendance. Costs being what they are, the exhibitor is forced to carefully appraise the economic feasibility of show participation.

Location of the annual meeting or show is another major factor. What is best: a location with a major tourist attraction to pull delegates and compete for show time, or a site where the product lines and the educational program are paramount?

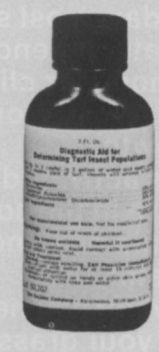
More questions can be raised regarding subject matter and quality, as well as variety of educational programs. Further, who is invited outside the association or society membership — and encouraged to attend.

We'd like to see shows and conferences with broader appeal — and with a clear invitation to non-members including all professionals interested in the business.

Take the guesswork out of turf insect control



Diagnostic Aid from TUCO



Many turf insect larvae are night feeders, so the first evidence of their activity frequently is damaged turf. Diagnostic Aid, applied to turf as directed, causes insects to emerge to the surface within 10 minutes. They can be identified and counted to determine the level of infestation and whether an insecticide should be applied. It also can be used after insecticide application to measure the control obtained.

Proxol* 80 SP Insecticide from TUCO

Proxol is the one insecticide developed especially for use on fine turf and ornamentals. Sod webworms and cutworms are two major groups of turf insects controlled by Proxol. It is estimated that each sod webworm larva can chew up 20 square inches of turf in its average life span of 20 to 40 days; the cutworm larva can devour up to 36 square inches. With 300 to 500 larvae generated from each adult in a period of 10 to 21 days, it becomes apparent why early detection and control are desirable. Using Diagnostic Aid and Proxol together lets you program insect control.

*Trademark

One bottle of Diagnostic Aid FREE in each case of Proxol 80 SP.

BEFORE USING ANY PESTICIDE STOP READ THE LABEL

TUCO Division of The Upjohn Company, Kalamazoo, Michigan 49001

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Strength that cuts it: Ford Flail Mowers

Ford flail mowers, inside and out, are built to handle tough, punishing work! Drive-line features heavy-duty components like banded V-section belt drives . . . high-capacity bearings . . . rugged gearbox. Welded frame braced by full-width torque tube maintains gear and drive alignment wrapped in a high-strength

sheet steel housing. Available with optional rear bumper, right-end bumper guard, gauge wheels, and steel or rubber gauge rollers. Ford flails are built to take it! And servicing is easy.

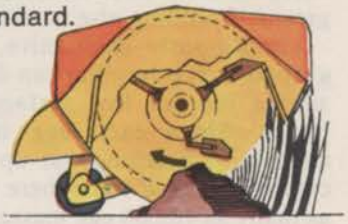
Blade hanger lets you remove one blade at a time. Bolt-on design makes blade removal and reattachment fast and easy.

Improved flail-safe design. Protective configuration of the heavy steel rear shield is designed to prevent straight-line ejection of material from under the mower housing, regardless of cutting height.

Three cutting widths. 62-inch, 74-inch, and 88-inch models are available to match your tractor power and mowing needs. All offset for ease of mowing close to trees and other obstacles.

Widen the range of flail mower applications. Rugged Ford flails improve mowing results even in some areas where you are now using rotary cutters and cutterbars.

Medium-cut or fine-cut blades are standard.



See your Ford tractor and equipment dealer. He is listed in the Yellow Pages under "Tractor Dealers" or "Contractors' Equipment & Supplies". See him for information on how to buy, lease, rent, finance.

Ford-for the long run

FORD TRACTORS

Ford

Rollover bar, tractor 3-point hitch, high-flotation tractor tires illustrated are optional at extra cost.

For More Details Circle (136) on Reply Card

One mistaken notion

that introduction of the Gypsy Moth into the U.S. could be of economic importance has resulted in unleasing one of the most serious insect pests this continent has ever experienced.

THE GYPSY moth was introduced into this country a hundred years ago under the assumption that it could be crossbred with the silkworm. Since that time, it has become a major pest in the Northeast and is threatening new areas every year.

A member of the order Lepidoptera, the gypsy moth lays millions upon millions of eggs every summer. The egg masses hatch out as caterpillars the following spring and begin feeding in April or May. They devour the leaves of shade trees — oak, hemlock, birch, willow but will defoliate fruit trees and even evergreens if nothing else is available.

Enormously destructive, a single two-inch caterpillar can devour a square foot of leaf surface in 24 hours. Since each egg mass is capable of hatching out up to 500 caterpillars, and since there may be as many as 10,000 egg masses in one heavily infested acre, the gypsy moth is capable of defoliating millions of acres of forest, parkland and wooded residential areas annually.

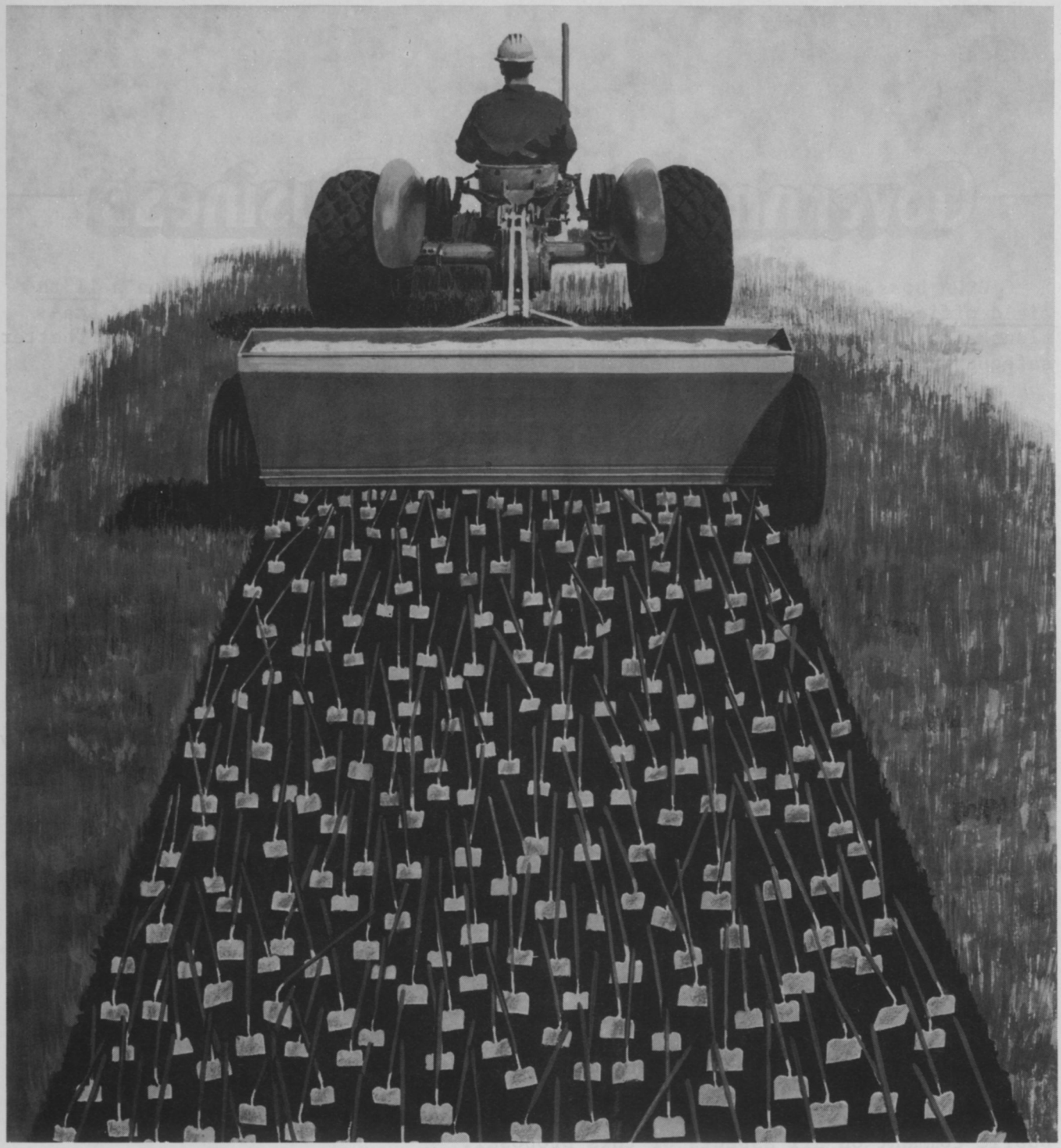
It is estimated that nearly two million acres of forest land suffered significant damage from gypsy moth infestation in 1974. The areas treated each year in State/Federal gypsy moth control programs are a tiny fraction of the total defoliated acreage and are limited to high-value areas. For example, in 1974 only 277,000 acres were sprayed under co-op programs. For 1975, the State/Federal co-op programs did not exceed 119,000 acres in the following states:

New Jersey	29,000 acres
New York	20,000 acres
Pennsylvania	55,000 acres
Rhode Island	15,000 acres

The gypsy moth is a moving target. It doesn't fly very far, but it's well-named nevertheless, since it has hitch-hiked for thousands of miles. Campers, trailers and trucks hauling forest products are among its favorite means of transportation, serving as ideal hiding places for the moth's egg masses, which may hatch, long distances away from where they were laid. Thus, in addition to heavy infestations in the

(continued on page 55)

The gypsy moth, with its voracious appetite, can devour a square foot of leaf surface in 24 hours. The U.S. Forest Service estimates that nearly two million acres of forest land suffered significant moth damage in 1974.



How to put a million tiny hoes to work aerating.

Just apply GRAND PRIZE® Lawn & Garden Gypsum to grassy areas and shrub beds. GRAND PRIZE will work down—like a million tiny hoes—to create a loose, porous soil structure where air and water can move . . . roots can freely feed and grow.

It supplies soluble calcium and sulfur in a readily absorbed form. Won't affect the pH of the soil. Helps fertilizers to be more effective, and organic matter to decay faster. In addition, GRAND PRIZE helps neutralize pet and deicing salt damage.

GRAND PRIZE is inexpensive and easy to use. While excellent for lawns, use it for flowers, vegetables and shrubs. If you want richer, greener lawns with less work, write for more information to 101 S. Wacker Drive, Chicago, Ill. 60606. Dept. WTT-35

CHEMICALS DIVISION

UNITED STATES GYPSUM

PRIMARY SUPPLIER OF SECONDARY PLANT NUTRIENTS

For More Details Circle (114) on Reply Card

Government News·Business

OSHA boss, John H. Stender, announced completion of his organization's 113th field office. The administration has more than doubled the number of field stations since its conception four years ago. Stender claims the increase will "better safeguard employee safety and health across the nation."

The Lawn Equipment Division of Hesston Corp. has tripled its production capacity and office space by moving its headquarters to a two-year-old building in the Lincoln Meadows East Industrial Park of southeast Indianapolis. The division was formerly located at 8640 Brookville Rd., Indianapolis.

A distributor leasing program for International Harvester's industrial equipment lines was recently reported by company officials. International's Credit Corporation has modified and liberalized its rental/lease plans to effect the new program. Eligible equipment includes all new industrial tractors, pay loggers, hydraulic excavators and related equipment. The units can be leased on either a short term or long term basis. The lease plan applies in all states except Louisiana and Wisconsin.

Standard Golf Company celebrates their Golden Anniversary in 1975. The company actually started business in 1910 by making steel gates, wagon tongues and related farm equipment. In 1925, they began making a few wood poles, flags and steel cups for the golf industry. Three years ago, Standard sold their farm product division and now spends full time in the golf course accessory business.

Herbert A. Jespersen has been named president of Ryan Equipment Co., a subsidiary of Outboard Marine Corporation. He was recently elected a vice president of Outboard Marine Corporation and division manager of OMC-Lincoln. Ryan Equipment Co. is in St. Paul.

EPA has proposed a uniform schedule of fees for document search and duplication. New amendments to the Freedom of Information Act is prompting government agencies to respond with search and duplication proposals. EPA proposes to set a charge of $2.50 for each half hour of record search time and $4.50 for each half hour for in-house computer programming time. The agency is soliciting public comment on all aspects of this proposal.

A new brochure entitled "Standards for Certification of Pesticide Applicators" was recently released by EPA. The original printing of the standards for "restricted use" pesticide applicators appeared in the Federal Register on October 9, 1974. The booklet is available from: Operations Division, Office of Pesticide Programs, U. S. Environmental Protection Agency, Washington, D. C. 20460.

OSHA has extended public comment period on proposed safety and health rules that would limit occupational noise exposure to 90 decibels over an eight-hour workday. Original rules were proposed October 24, 1974 in the Federal Register and allowed public comment until December 9. Public requests extended the date until January 22. The latest extension was granted in response to additional requests to allow adequate time to study the complex issues involved.

A burst of brilliance...
Fylking for the World's Fair!

Fylking Kentucky bluegrass is a superior, elite bluegrass that burst like a star on the scene in the sixties!
Since then Fylking has established records making it the perfect choice for the official grass at the environmental World's Fair, Expo '74.
Fylking has proven to have superior resistance to disease and drought; withstands traffic. Its thickly woven rhizome root system develops dense sod so quickly Fylking can be lifted in 90 days. Fylking can be mowed at 3/4 inch (even 1/2 inch) and thrive. It absorbs carbon dioxide pollutants, gives off oxygen, cools air by releasing water vapor.

A superior mixer, Fylking greens up earlier in spring, stays greener in summer heat, remains green longer into fall.

Choose Fylking and your customers are getting a grass good enough for a World's Fair!

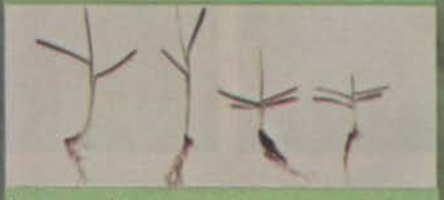
0217

FYLKING KENTUCKY BLUEGRASS

U. S. Plant Patent 2887

Another fine product of Jacklin Seed Company

Fylking's rhizome root system develops so thickly, under ideal conditions sod can be lifted in 90 DAYS.



Low growth, short leaf sheaths and abundant tillering of Fylking (right) compared with another elite bluegrass plant.

Cross section displays thick, luxuriant turf, fine leaf texture and brilliant green color of Fylking.

For More Details Circle (121) on Reply Card

Give crabgrass

(Like 2 feet in 10 weeks. It'll also produce 3,000 seeds to grow on you next time. Balan® nips all this in the bud.)

a chance and it'll grow on you.

One of Elanco's dependable weed-control crew

Untreated, there'll be a bigger crop next time, make no mistake. With your fertilizing and watering, crabgrass plants become fully-equipped seed factories in ten weeks.

Balan puts crabgrass out of business. Other annual weedgrasses, as well. A pre-emergence weed killer, Balan forms its protective zone where seeds germinate. Kills 'em, despite heavy rains and irrigations.

Works economically even on big areas. Costs $17 to $33 an acre. (Certain warm-season areas require two applications at a heavier rate for year-around control.)

Balan is convenient, too — granules are easily applied with your equipment. Make Balan's crabgrass control a key step in your lawn-care. See your turf supply and equipment distributor now. Or contact us for the name of the distributor nearest you.

Elanco Products Company, a division of Eli Lilly and Company, Dept. E-455, Indianapolis, Ind. 46206, U.S.A.

ELANCO

Balan

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AERIAL WAR ON TUSSOCK AND

TWO FRONTS: GYPSY MOTHS

TWO of the forest's most destructive enemies attacked on two fronts last year, as if in a planned alliance. Proliferating rapidly, both the tussock moth in the West and the gypsy moth in the East had forest experts in doubt about the future's balance of power in private woodlands and national forests and parks.

In Washington, Oregon and parts of Idaho, the tussocks seemed able to time the start of their biggest offensive in 1973, when the traditional and most effective weapon against them, DDT, had been banned by the National Environmental Protection Agency.

Gypsy moth invasions were causing the most damage in northeastern states, but like the tussocks, gypsies readily disperse themselves by the wind, so other parts of the East, Southeast and even Midwest may be in for trouble. Particularly vulnerable will be the oak forests of the Appalachian and Ozark Mountains and Southern oak-pine stands, all containing high concentrations of favorite gypsy moth edibles.

New Tactics

Federal and state forest agencies adopted some new tactics against both infestations for 1974. In the western states, Forest Service officials were faced with the defoliation and loss of an estimated 400,000 acres of Douglas fir and other conifers. That would be compounded by the threat of great fires which often result in the dry-dead stands defoliated by the tussock. Public pressures to end what promised to be catastrophic losses in timber grew beyond the earlier pressures to halt the use of DDT.

The eastern gypsies, until 1963 controlled by DDT spraying, were also becoming the subject of public outcry for action. In those states, limited spraying with DDT alternatives had been going on for several years, but had failed to check the rapid spread of moth populations.

The new battle plans drawn for both sides of the nation bore some interesting resemblances to one another. Long-range, foresters worked toward basic biological control programs. Gypsy and tussock moth infestations, after causing severe defoliation in a given area, do tend to collapse after a two to three-year period, having eaten themselves out of business. It is hoped that the introduction of parasites, natural predators and/or treatments with virus, bacillus and sex attractants will, if all goes well, eventually cause earlier collapses and thus reduce the acres destroyed each year. *(continued on page 28)*

TOTAL TURF CARE IS HERE!

Get a full course of protection against weeds and disease.

Dacthal®

Start your Total Turf Care this year with Dacthal W-75 herbicide. Or use the convenient 5 percent granular form if you like.

Dacthal gets the jump on most annual grasses and broadleaf weeds. This preemergence herbicide prevents weeds as they germinate. Crabgrass and *Poa annua* don't have a chance. Yet, Dacthal is a truly selective herbicide that will not affect established grass. It's even safe for new grass when used according to label directions.

Just one application in early spring will control weeds for a full season. In the case of *Poa annua*, another application in late summer keeps this late germinating pest out of sight.

Don't worry about residue build-up either. Dacthal degrades in one season; it's not persistent in the soil.

Dacamine®

For those areas where broadleaf weeds are a problem, use Dacamine Turf herbicide to sustain your Total Turf Care. Postemergence Dacamine kills dandelion, plantain, poison ivy, knotweed and other broadleaf weeds.

Dacamine is an oil soluble diamine form of 2,4-D which is formulated to be used *only* with water. It combines the weed-killing power of an ester with the safety of an amine. Dacamine stays put—kills the weeds you spray it on but won't vaporize and damage valuable plants nearby. Its unique formulation penetrates waxy weed foliage—then moves all the way to the roots, killing the whole plant not just the top.

Daconil 2787®

Total Turf Care includes broad-spectrum disease control. Daconil 2787 is the one fungicide that solves most disease problems. Why use a group of fungicides to do what Daconil 2787 can do by itself?

Use Daconil 2787 to prevent or cure: Brown Patch, Copper Spot, Dollar Spot, Leaf Spot, Melting Out, Red Thread and more. Many leading golf courses use Daconil 2787 in their disease prevention program.

Daconil 2787 has performed well on over 25 grass species and varieties. Excellent turf tolerance allows you to use it even in hot, humid weather.

Just mix Daconil 2787 with water and spray. You don't need a surfactant. It's compatible with many commonly-used pesticides. Follow label directions for exact usage.

Daconate®

Round out your Total Turf Care with Daconate postemergence herbicide. Get those escape weeds that slipped by your preemerge. Daconate will effectively control crabgrass, chickweed, wood sorrel and other hard-to-kill weeds. It's economical, too.

Daconate is a ready-to-use arsonate liquid, pre-mixed with the right amount of surfactant for maximum coverage and control. Since it is an organic arsenic compound, it does not have the more toxic properties of inorganic arsenic compounds, such as calcium or lead arsenate. For best results, spray Daconate during warm weather when weeds are actively growing.

Ask your turf chemicals supplier for more information or write: Agricultural Chemicals Division, Diamond Shamrock Chemical Company, 1100 Superior Avenue, Cleveland, Ohio 44114.

Diamond Shamrock

MOTIVATING the TURNED-OFF EMPLOYEE

PART III Motivation

By DR. JOHN L. McKEEVER, Colorado State University

THERE IS NO easy remedy to the problem of understanding and motivating employees. Managerial gimmicks such as the "ten easy steps" approach will never provide solutions to the human problems in any organization. Many gimmicks have been devised and recommended to managers that have created more human problems than they ever resolved.

The only way that managers will ever achieve any degree of loyalty, respect, productivity and cooperation will be when they are able to understand the nature of human behavior of employees as they strive to achieve goals and satisfy needs — individually and collectively. As was discussed in the Parts I and II, employees establish goals that must be achieved in the work environment. The goals that employees establish are based on a common set of needs posessed by all humans. Goal achievement results in need satisfaction and when employees do not achieve their personal goals in the work environment they are demotivated and may become counterproductive. It is the purpose of Part III to explore a few of the alternatives available to management to create a more challenging and positive work environment.

Change in Managerial Attitudes

Many of the deeply ingrained attitudes of managers toward employees negatively affect the decisions they make in the organization. Many of these attitudes have been acquired over years of learning experiences and frequently result from the biased and prejudiced judgement of others who had some influence on our learning processes. It is not unusual for many attitudes to be passed on from parents to children, from teacher to student or from the boss to subordinate. The author has known instances in which the attitudes of well-educated and professional people toward labor were so negative that they blamed labor (union and non-union employees) for every economic problem in the nation. Conversely, there are those who are extremely biased and prejudiced toward management.

These deeply ingrained attitudes should be brought out of the closet and subjected to careful examination. I am sure that a logical analysis of management-labor problems would reveal that the objectives of the organization and personal goals of the people in the organization are not incompatible. In fact, they are extremely compatible and the failure to consider the objectives of each other will result in some degree of goal failure for both. When employees do not achieve personal goals and, consequently, satisfy needs in the work environment there is positively no way that management will be able to maximize or optimize organizational goals.

Management should carefully consider their decisions in terms of the goals and needs of the employees and the reaction a decision will have upon them — individually and collectively. Management should especially evaluate decisions in terms of their effect on the social, ego and creative needs of employees. You had better believe that money and fringe benefits are motivators of employee but there is a point in which these factors will not motivate individuals to greater effort or loyalty if other needs are not being satisfied in the organization. In fact, salaries, wages and fringe benefits as motivators may be negated completely if management is providing social, ego and creative need dissatisfaction in the work environment. This results in the resignation of good employees or of their performing at something less than their potential.

There are many managerial decisions that reflect a negative attitude toward the work force that in turn may lead to negative reactions by personnel affected by the decision. Every policy, rule, regulation, procedure, schedule program, control, budget and other established organizational directive that affects human behavior should be evaluated to determine and eliminate the negative aspects from the order or directive if they exist. It is self-evident that any negative act will generate a negative reaction.

So many management decisions are colored by deeply ingrained attitudes that they are made inadvertently and without known bias and prejudice on the part of the manager. When the negative element of the decision is revealed to the manager it is often a surprise to him that it contained a negative factor. If a self-evaluation by the manager of his decisions succeeds in indentifying one ingrained negative attitude, a step in the right direction will have been made. It is doubtful that the manager will discard a recognized deep-seated feeling immediately, if ever. What the evaluation will do is make the manager aware of how his feelings and be-

(continued)

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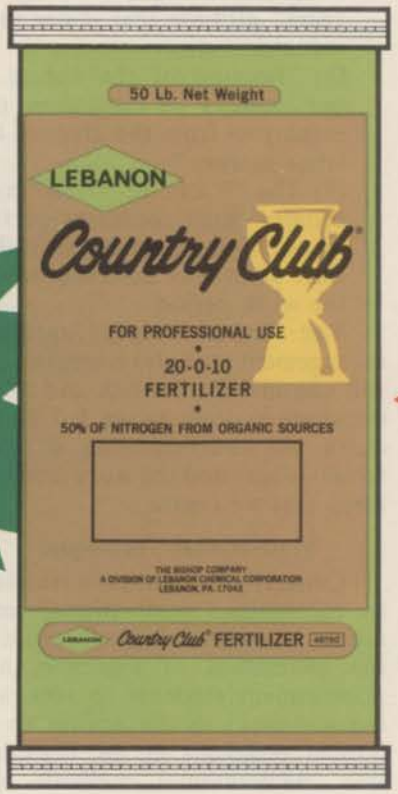

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havioral patterns affect and color his decisions and his awareness should encourage him to consider them in future decisions. Change may not come easy for it is difficult to admit that we could have been wrong for so long.

These feelings are common in managers and may include all of the Theory X concepts of Douglas McGregor[1] and many others. A few of the typical deep-seated attitudes that may affect management decisions are as follows:

(1) Employees are motivated only by wage and fringe benefit goals.

(2) Employees are irresponsible and will shirk responsibility in the organization.

(3) The divergent nature of organization objectives and employee goals make them incompatible and in conflict with each other.

(4) The "my investment, my risk, my decision" syndrome that fails to consider the capabilities of employees.

(5) Employees must be constantly threatened and coerced if they are to do any work at all.

(6) Workers are basically lazy, gullible, dishonest and not too bright.

(7) The "don't rock the boat, we have been doing it this way for years" attitude that stifles individual initiative.

(8) "Because of the nature of our industry we must draw our employees from the dregs of the labor market."

(9) The "8 a.m. to 5 p.m." syndrome which measures performance in hours on the job rather than what was achieved during the work period.

The list of deeply ingrained management attitudes is lengthy and will continue to flourish and affect decisions as long as we fail to acquire an understanding of ourselves, others and the work environment that we create.

Motivational Techniques

Generally the author is reluctant to recommend motivational techniques or methodologies because of the inclination of managers and management students to seek and use gimmicks as the answer to all human problems in the organization. Motivational methods and techniques have purpose only as a part of the total process of understanding human motivation and behavior. In other words, if the organizational objectives are to be achieved, the human resource in the organization must be motivated by all managerial decisions concerned with employees and not by a few techniques.

In determining procedures, techniques or methods used in the motivation of employees, managers in organizations can be very innovative and creative. For example, managers should approach the problem by determining and/or evaluating managerial actions and decisions in terms of the need satisfactions of employees in the organization. If the economic needs (salaries, wages and fringe benefits) of employees are reasonably satisfied, management should determine the types of programs or actions that would provide greater social, ego and creative need satisfaction to the employees. Management can do a number of things to provide a work environment conducive to the motivation of employees that had not been considered before in the organization. Motivational techniques can be devised that will provide for greater opportunity, fairness, recognition and personal growth and development for employees.

Participative Management

One technique the author would recommend is participative management. To avoid any confusion or suspicion of the term the following definition should explain the process:

> "Participative management encourages all employees to participate in making decisions, (1) of a non-routine nature, (2) when the decision will affect them in the environment and (3) the manager must always retain the prerogative of making the final decision."

In participative management the employees are given greater control over their work environment by being able to participate in making non-routine decisions that affect their life in the organization. It should be noted that the author's conception of participative management does not give the final deci-

sion to employees but encourages their ideas, suggestions and recommendations. The final decision must always be the responsibility of one person, the manager.

Participative management provides employees the opportunity to satisfy creative and ego need satisfactions and if the participation is performed in a meeting or conference type of discussion process it will provide social need satisfaction. Participative management is merely the utilization of the democratic process in the work environment. Many work environments tend to be dictatorial or monarchial in nature and, consequently, discourage a free flow of ideas from those who may be creatively inclined but managerially demotivated.

Employee Training

Regardless of the type or size of the organization, training programs can be utilized to provide opportunity for employees. If opportunity is not provided in an organization, creative employees may not remain with the company. Many small organizations tend to shut the door on this aspect of employee motivation by assuming there is nothing to be learned on the job once a few simple procedural work activities have been mastered. Actually, on-the-job training opportunity can be provided employees in any work situation no matter how proceduralized and simple the activities. Through the use of well devised and well written job classifications, a progression of promotional possibilities can be established. The employee can move from job class to job class entailing a pre-planned and orderly promotional path in the organization.

In many company operations, work activities have been broken down into a series of simplified, procedural steps over a period of time (construction cycle, growing period, etc.) and each step requires some time to learn and perform efficiently. In instances like this, if employees can be trained to understand and perform all the operations in the entire sequence of activities, responsibilities have been enlarged and the job takes a greater meaning to the employee. In fact, by training employees to perform all the activities in the entire operation, they can see the end result of their efforts over the entire production cycle. This is a problem in many large organizations in which the individual efforts of employees often cannot be identified with the final product. By systematically and chronologically establishing a well designed over-all training program, you have not only provided an environment conducive to opportunity but the employees may acquire a professional knowledge of the entire operation in which their services are enhanced and their personal worth increased. This process is referred to as job enlargement or job enrichment and results in an increase of responsibilities performed by the employee. Job enlargement through training enhances the ego need and provides the employee with potential to be more creative. From this point on, employee training can be directed toward other functional and management areas.

One of the points the author is making above is that management in industries in which many of the production jobs seem very menial and demotivational can establish training programs that will provide employees with greater opportunity for personal professional develop-

(continued on page 67)

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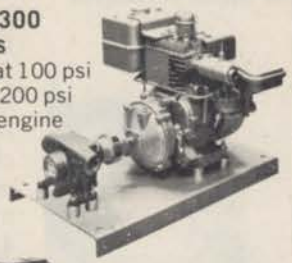

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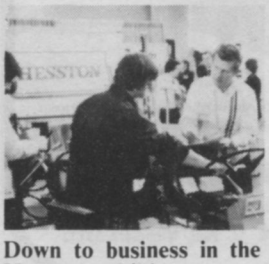
Here is the 1975 Executive Committee of the Golf Course Superintendents Association of America: Left to right, back row, Theodore W. Woehrle, Oakland Hills Country Club, Birmingham, Mich.; L. D. Haines, Denver Country Club; Charles Baskin, Country Club of Waterbury, Conn.; Gordon Witteveen, Board of Trade Country Club, Woodridge, Ontario, Canada; Charles H. Tadge, Mayfield Country Club, South Euclid, Ohio; Richard W. Malpass, new vice president, Riverside Golf and Country Club, Portland, Ore.; front row, elvin B. Lucas, Jr., Garden City Golf Club, Garden City, N.Y.; Palmer Maples, Jr., the Standard Club, Atlanta, new president; and George Cleaver, Chestnut Ridge Country Club, Lutherville, Md.

New Orleans Turfgrass Meeting

GCSAA Show Attendance: 4,899

Ted Smith of Smithco

Peggy, left, and Bobbie Cleary of W.A. Cleary Corporation.



Down to business in the Hesston exhibit area.

ATTENDANCE at last month's International Turfgrass Conference and Show in New Orleans slipped somewhat lower than the 1974 sessions in Anaheim. This year's meeting (the annual big conference and show held by the Golf Course Superintendents Association of American) attracted 1,384 superintendents — up 134 from last year. Exhibitor attendance, though, was down 445 from last year. Attendance by the ladies was 107 better than in 1974. And overall total attendance including members, ladies, nonmembers, guests, one-day admissions and exibitors reached, 4,899.

Despite the obvious pressures of inflation and budget squeezing back home, superintendents arrived in New Orleans with a bright outlook for a successful spring and summer season. The program worked heavily on the area of management — fast rising as the number one growth area for conferences and meetings.

Dr. Charles A. Lewis saw serious challenges in management which arise from a need to use human and financial resources effectively. He told conference delegates that superintendents need to keep updating skills and sensitivites in the area of people relations.

Lewis, who is chairman of the Recreation Education Department at Cortland State College, Cortland, New York, recounted the phrases "golf is a downright unhealthy game. Emotions can eat you alive. You're not supposed to yell, cuss, or throw clubs."

Indeed, for the players emotions do run high, Lewis said. and in many cases, the superintendent, in his unique and all-encompassing role, frequently becomes the scapegoat for everything from turf conditions to missed putts, etc.

Trends indicate that changes are occuring in golfer habits, in relationships between local and state associations, in ownership from private to public operations, and in small business practices and personnel management.

People relations, as Lewis said, are important in supervisory relationships between superintendents and the people who employ him, the people who work for and with him, and the golf-oriented public which uses the facilities under his care.

Dr. John Hall of the Univer-

John Kincaid of National Mower

Doris Watson of Hercules

The president of Jacobsen, F. W. Schneider

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The turf-care line-up.

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In the Lofts exhibit, Peter Loft, left, and Dr. Fred Ledeboer greet visitors.

Abe Suleman, sales for western region of Excel Industries, Inc.

Toro's Jim Maloney talks with Gerald Brenneman.

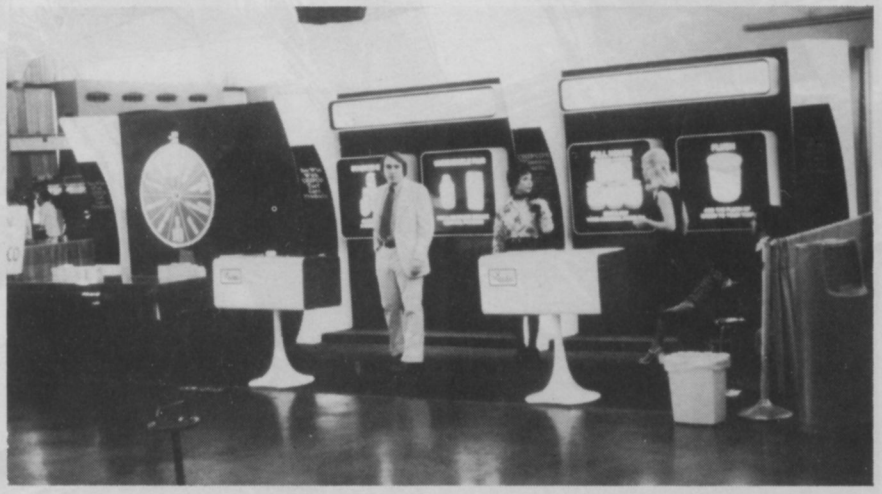
sity of Maryland's agronomy department, placed the stress of his management talk on the management program for turfgrass.

The spiderweb of turfgrass management, he said, means the intricacies of turfgrass management are tied together much as the strands of a spiderweb are inexorably tied to one another. Each management practice influences the others and the goal of all students of turf is to completely understand the impact of any management practice upon all others. Hardin's law emphatically states: "There is no single effect." As our management programs are developed involving mowing, fertilization, irrigation, cultivation and pest control we must constantly strive to increase our understanding of how turfgrass reacts to our management program.

No management factor can be used in the program without influencing other management factors, Hall said. The nitrogen level which is selected influences proper mowing height and frequency, irrigation requirements and insect and disease populations. The turfgrass plant's reactions to the management program is critical because the management response influences all other management factors.

Nearly 150 exhibitors set up their wares in the 100,000 sq. ft. Rivergate exhibit hall.

Jackson Tyron, left, and Howard Kaermer of Northrup King.



The Rhodia exhibit area.

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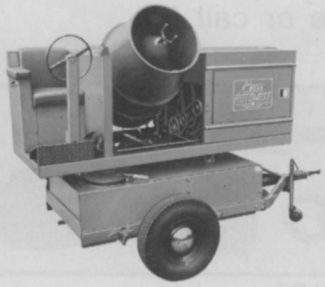

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FMC Environmental Equipment

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AERIAL WAR *(from page 17)*

In the meantime, action was urgently needed to head off the disaster in the West and to at least buy more time in the East where the gypsy population explosions were far outpacing the collapses. It was obvious that 1974 would be crucial on both coasts. Tussock blights were affecting up to a million acres in huge blocks of prime timber. In an era of rising timber economics, one of the large private landowners was reporting timber destroyed or damaged in stands worth over $10 million. This was all the more frustrating because it was generally known that just one application of DDT could probably halt losses until natural solutions could be established.

Tussock Control Solution

To combat the tussock moth crisis, a temporary return to DDT for one year's application was approved for the summer of 1974, getting support from some of the same elected officials and others who had pushed for the DDT ban earlier. In the worst infestations it was agreed that only a kill of from 95 to 99 percent would stop the tussock, and only DDT could do it.

The time frame was critical for that kind of result. Over 400,000 acres in southeastern Washington, northeastern Oregon and western Idaho had to be sprayed within a few days of the insect's hatching, which occurs at varying times depending on elevation and temperatures in each area.

Helicopter Fleet

Teamed with the DDT emergency weapon, a fleet of larger, faster helicopters than had previously been conventional in aerial application was chosen by the Forest Service. Charter aircraft operator Evergreen Helicopters, Inc. headquartered in McMinnville, Oregon had been refining the use of spray equipment on its Bell 205 turbine ships, carrying a 400-gallon internal spray tank, and capable of speeds above 90 mph.

Five of these Evergreen 205's, working in concert with three light helicopters were programmed and re-programmed by the company's application specialists according to the hatching periods in each stand.

Elaborate control systems governed the project throughout, and following its completion on July 21, the more than 150 monitors were unable to find one fish, fowl, rodent or other wildlife casualty. In order to determine exact chemical concentrations in the wildlife biologists did, however, kill 500 specimens before and after the project.

For the large, widespread plots of the tussock application, the larger helicopter used by Evergreen was not only more effective but also economically competitive with small ships with much lower per-hour operating costs. Able to reach production rates of between 1000 to 1400 acres per hour depending on conditions, the Bell 205 could handle the work of five smaller helicopters, and at the same time permit a drastic reduction in the cost of chase ships required; there were simply fewer application aircraft to chase.

(continued)

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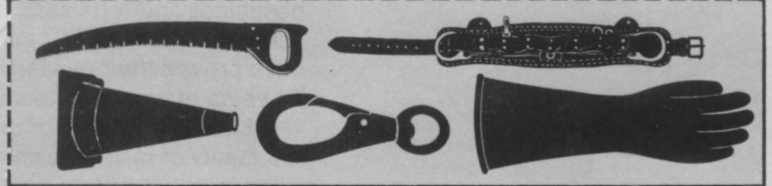

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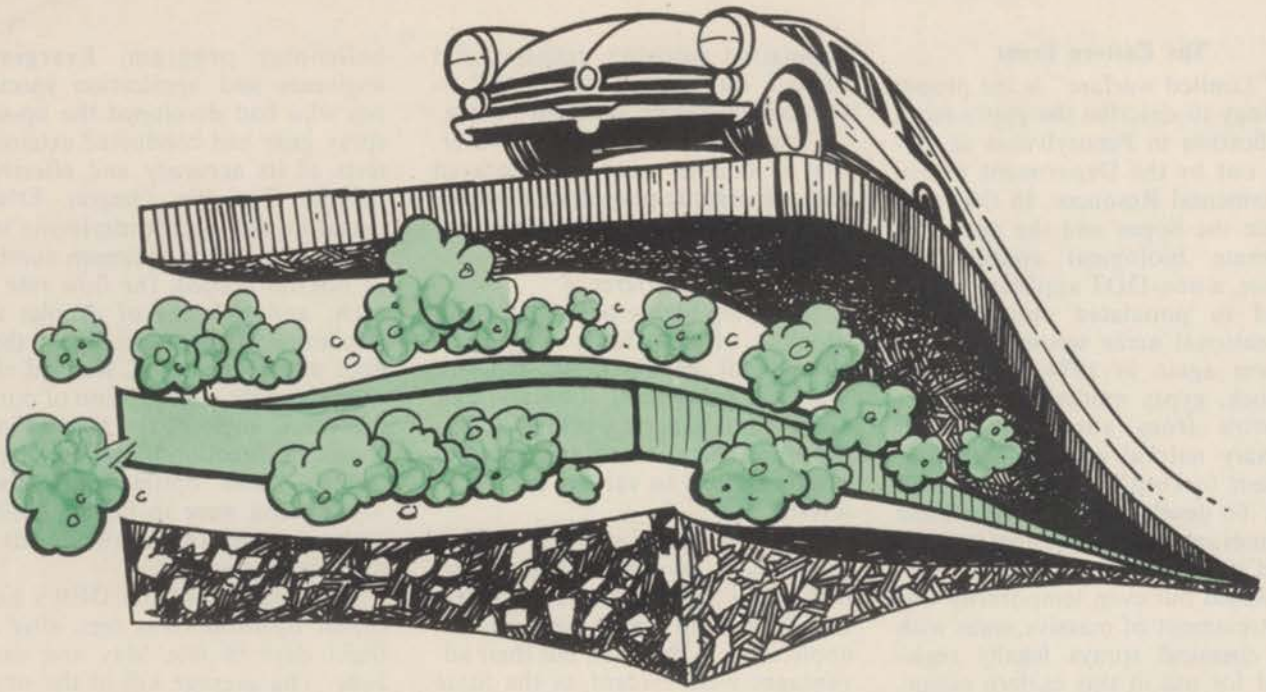

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The Eastern Front

"Limited warfare" is the proper analogy to describe the gypsy moth application in Pennsylvania as carried out by the Department of Environmental Resouces. In that area where the hopes and the needs for ultimate biological control are higher, a non-DDT application confined to populated and high-use recreational areas seemed the only answer again in 1974. Unlike the tussock, gypsy moths came to this country from abroad, so their primary natural enemies were not present to keep it under some control. To develop and establish these enemies in the U. S. is now government's number one objective.

Ruled out even temporarily was the treatment of massive areas with the chemical sprays legally registered for use in this eastern sector. They would provide only a 90 percent or less kill with one application, and when large, contiguous land areas are treated, the surviving gypsies will re-populate to destructive levels in two to three years. With plenty of food to eat, the gypsy population wouldn't collapse, and today's one "natural" control — that collapse cycle — might be lost.

Experience showed, however, that if smaller areas were sprayed with an organic phosphate (Dylox), residents and trees of each block would get relief from the moth without collapse interference.

Spraying highly populated small blocks, often widely dispersed throughout Pennsylvania, required a multi-talented team of county, state and federal experts working with a list of realistic controls and a plan of responsiveness to varying public interests.

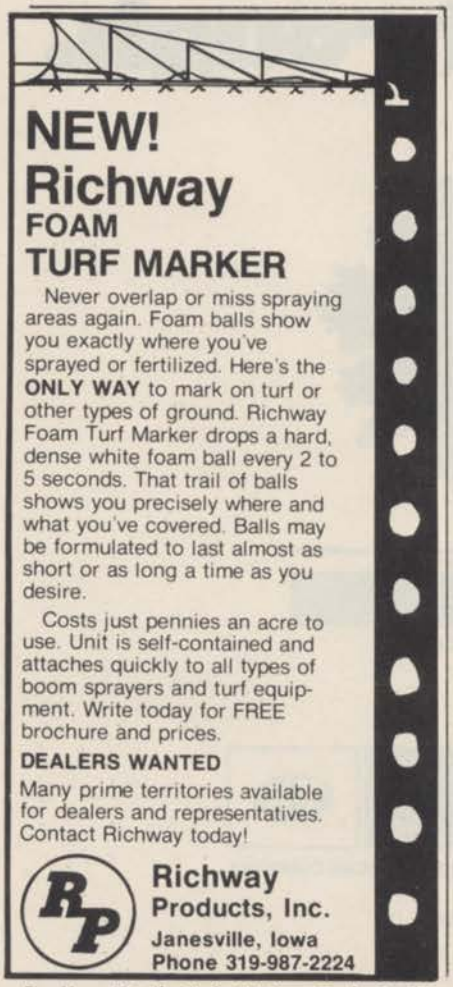
And, as in the western tussock program, it favored a fleet of big, fast spray helicopters. Helicopters this large had never operated as applicators in the East, but their advantages were evident as the State contemplated doubling 1973's treatment area. Although the blocks to be sprayed varied from large to small, the distance between them was often extensive. Thus ferry speed and the Evergreen 205's 400-gallon tank capacity were important, while its maneuverability and precision for the carefully delineated blocks were essential.

Two Evergreen 205's, and one of the company's small Hiller 12E's for flexibility made the team. These ships treated with Dylox some 71,000 acres in Pennsylvania. Evergreen also provided two fixed wing airplanes for application of the bacteriological spray Bt (Bacillus thuringiensis), which was used around infested reservoir sites in the sections of the State. The Bt was carried by two Grumman TBM's and a Piper Pawnee, and was applied in two treatments for each of 48,000 acres.

Although the Dylox was proven harmless to every form of wildlife except the gypsy moth and a few other insect species, care was taken by the Department of Environmental Resources to both inform the public and to restrict spraying to closely specified and approved boundaries. The Dylox used was a special Chemagro formulation to assure a perfect balance between kill and avoidance of damage to such surfaces as car paint, etc. To monitor this balance result, company representatives were stationed there most of the time.

Before activating the large 205 helicopter program, Evergreen engineers and application specialists who had developed the up-size spray gear had conducted extensive tests of its accuracy and effectiveness in Corvallis, Oregon. Established in that pre-Pennsylvania test program were the optimum number of nozzles needed, the flow rate of each, and the size of droplet for minimum effect from drift, thermals and evaporation. Refined also were the right combination of pump pressures, angle of the nozzles into the flight direction to obtain proper "shear," and optimum airspeed. The criteria were to be compatible with an application of two-thirds of a gallon per acre.

The success of the DER's helicopter operation was seen after 21 flight days in late May and early June. The average kill in the single Dylox application achieved or exceeded expectations. Unlike the western tussock suppression, where control was complete and widespread enough to preclude major spray programs in the foreseeable future, the gypsy battle will continue this year and until the ultimate biological weapon is established. In the meantime, it's evident that an interim control strategy has been updated and refined which can be depended upon for temporary relief of local congestion. □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'ADELGIDS': The Aphid Controversy

By DR. R. LEE CAMPBELL
Associate Entomologist
Western Washington Research
and Extension Center
Puyallup, WA

PINE BARK aphid, eastern spruce gall aphid, balsam woolly aphid — these and other insects in the subfamily Adelginae have been given names which include the word 'aphid.' They are not very much like true aphids but are more closely related to the grape phylloxera which devastated the French vineyards in the latter part of the nineteenth century.

Generally names, as such, are unimportant but in this case they have led to misunderstanding and resultant economic loss. Perhaps a change is in order. I propose to call them 'adelgids.'

The problem is that the physiology of the adelgids differs from that of aphids and, as a result, insecticides which are very effective in controlling aphids are often useless against adelgids. However, since they are stuck with the name and most people do not know their idiosyncrasies, many who try to combat them with aphicides are disappointed with the results. In general, organophosphate insecticides, such as malathion, are used for aphid control but are not effective against adelgids, while carbamates, such as carbaryl, are excellent for adelgid control and not very effective against most aphids. Endosulfan, a chlorinated insecticide, is an example which is effective in control of both aphids and adelgids.

The adelgids are an extremely in-

(continued on page 58)

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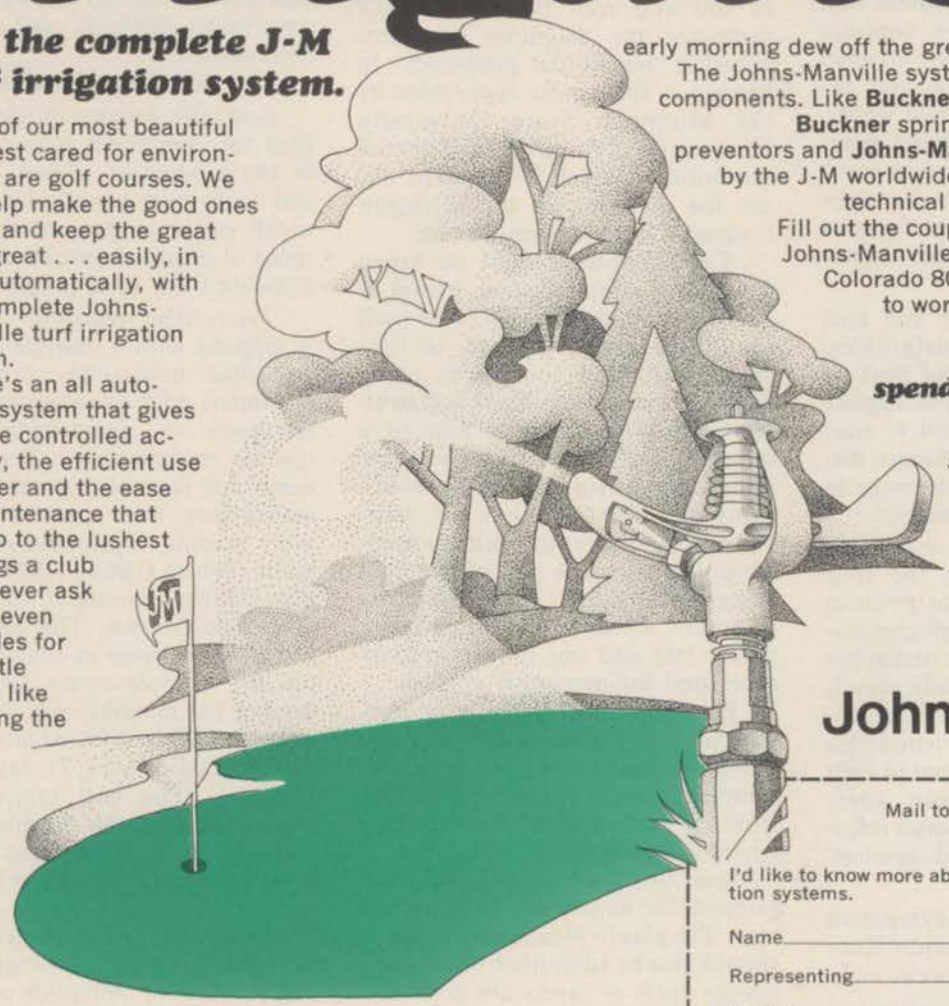

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Turfgrass Nematode Problems:
Diagnosis and Control

By DR. G. W. BIRD*

PLANT PARASITIC nematodes are microscopic worms that usually feed on the roots of plants. In Michigan, they can be severe pests of turfgrasses.

Above-ground symptoms of nematode-infested turf include yellowing of leaves, dieback and breakdown of young foliage and a tendency to wilt during periods of high temperature and low moisture. Grass cover generally becomes thin and growth during the summer months is poor. Severely affected areas may become bare and infested by annual grasses and weeds. In addition to causing direct damage to root systems, feeding by some plant parasitic nematodes increases susceptibility of certain turfgrasses to diseases caused by other organisms.

Some nematodes live and feed within the roots of turfgrasses. Others live in the soil and feed on the root surface. Both types migrate through the soil from root to root and can be moved even longer distances in sod, irrigation water or in soil on mechanical equipment.

Stunt, stubby-root, root-knot and cyst nematodes are the four most important nematode pests in Michigan turfgrasses. High population densities of the stunt nematode appear to be very commonly associated with Michigan turfgrasses. Spiral, ring and sheath nematodes are also frequently recovered in high numbers from Michigan turfgrasses; however, their overall influence on plant growth and development is unknown.

In Michigan, typical symptoms of Fusarium blight of Merion Kentucky bluegrass usually occur only in the presence of both stunt nematodes and the fungus *Fusarium roseum*. The stunt nematode renders this grass susceptible to the fungus and appears to be the dominant causal agent in this disease complex.

Nematode Detection

Because nematodes are microscopic and the damage they cause is very similar to that resulting from other factors, a laboratory analysis of soil and root tissue is usually necessary for diagnosis of plant-parasitic nematode problems. In Michigan, this service is provided by the Michigan State University Nematode Diagnostic Service Laboratory, which is operated under the direction of the Michigan Cooperative Extension Service.

Turf samples should be taken with a soil sampling tube, trowel or narrow-bladed shovel. The soil should be taken at a one- to five-inch depth, and contain as many feeder roots as possible. Each sample should consist of a pint to a quart of soil taken from a larger sample composed of 10 or more subsamples. The number of subsamples (soil cores or borings) needed depends on the size of the area being investigated. The subsamples should be mixed in a clean pail or a plastic bag and one pint to a quart submitted for nematode analysis.

Plant parasitic nematodes feed only on living tissues and are rarely found in dead roots. Soil and root samples, therefore, should be taken from the margin of the problem area where the turfgrass is still living.

Sod farm acreage should be sampled for nematodes before seeding. Pre-plant nematode samples should also be submitted where high quality turfs or lawns are desired.

Additional information about diagnosis and control of nematode problems of turfgrass can be obtained by requesting Michigan State's Cooperative Extension Service Bulletin E-800, "Nematode Detection," and E-701, "The Hidden Enemy: Nematodes and Their Control," Michigan State University Bulletin Office, P.O. Box 231, East Lansing, Mich. 48824.

(Editor's note: Residents of other states should contact their local county extension agent or their state's land grant university for information concerning diagnosis and sampling procedures.)

Sod Farm Control

Sod farm acreage should be sampled for nematodes before seeding. In the production of sod, commercial turfs and private lawns, it is much easier to prevent the occurrence of nematode problems than to alleviate them once present.

Pre-seeding treatment — If a site is infested with a detrimental plant parasitic nematode, pre-seeding treatment with an appropriate soil fumigant or nematicide is frequently recommended. This type of nematode control is generally more satisfactory than treatment at or after seeding. Pre-plant soil fumigants such as DBCP, 1,3-D or 1,3-D plus chloropicrin are all suitable for nematode control. The amount of chemical required in organic soil is usually approximately twice that needed for mineral soil. Soil fumigants should be injected into the soil and applied at least 21 days before planting. The soil temperatures should be between 50 and 80 degrees F. Prior to seeding, the soil must be worked to release the fumigant.

Treatment of established sod — DBCP is the only soil fumigant that can be used for nematode control in established sod. To insure good penetration of the chemical, it must be applied as a drench.

*The author is a nematologist in the Department of Entomology and the Department of Botany and Plant Pathology, Michigan State University.

The granular nematicides Fensulfothion and Phenamophos can be used to control nematodes in established sod. They must be uniformly distributed over the area to be treated and drenched immediately after application. The sod should not be harvested for at least 60 days after application. Fensulfothion and Phenamophos are for professional application only.

Commercial Turf Control

Sites to be used for the establishment of high quality commercial turfs should be sampled for nematodes before seeding or sodding. If sod is to be used, it is best to obtain a high quality product grown in nematode-free, nematicide-treated or fumigated soil. This precaution, however, will be of little value unless the soil where the sod is to be used is nematode-free, nematicide-treated or fumigated.

Pre-plant treatment — If a site is infested with a detrimental plant parasitic nematode, pre-plant treatment with an appropriate soil fumigant or nematicide is requently recommended. This type of control is generally more satisfactory than treatment at or after seeding or sodding. The same pre-plant soil fumigants recommended for pre-seeding sod farm nematode control — DBCP, 1,3-D or 1,3-D plus chloropicrin — are all suitable for nematode control in future commercial turf sites. Treatment is the same as described previously under the sod farm control heading.

Treatment of established commercial turfs — DBCP is also the only soil fumigant that can be used for nematode control in established commercial turfs. It must be applied to commercial turfs as a drench, as in the treatment of established sod. The granular nematicides Fensulfothion and Phenamophos can also be used to control nematodes in many established commercial turfs. They are for professional application only, and may not be suitable for use in certain situations. These materials must be uniformly distributed over the turf and drenched immediately after application.

Home Lawn Control

Sites to be used for the establishment of high quality home lawns should be sampled for nematodes before seeding or sodding. If sod is to be used, again it is best to obtain a high quality product grown in nematode-free, nematicide-treated or fumigated soil, providing the soil where the sod is to be used is nematode-free, nematicide-treated or fumigated.

Pre-plant treatment — If a site is infested with a detrimental plant parasitic nematode, preplant treatment with an appropriate soil fumigant is frequently recommended. This type of control is generally more satisfactory than treatment at or after seeding or sodding.

Treatment of established home lawns — DBCP is the only compound recommended for nematode control in established home lawns. It must be applied by a professional applicator, and to insure good chemical penetration, it should be used as a drench. □

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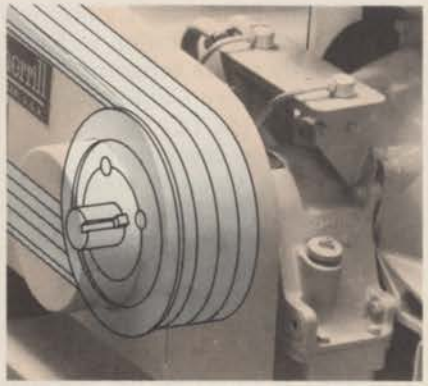

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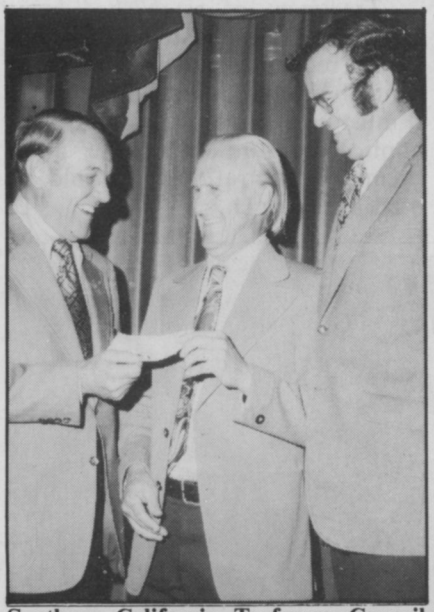
Industry News and Newsmakers



Southern California Turfgrass Council President Alfred N. Nobel (left) presents the Council's check to Victor B. Youngner and Victor A. Gibeault for turfgrass research at the University of California's South Coast Field Station.

California Turfgrass Council Aids Research With $6000

The turfgrass research program at the University of California's South Coast Field Station in Santa Ana recently got an economic boost from the Southern California Turfgrass Council (SCTC).

Fulfilling a commitment made last year, the Council presented a $3,000 check to U.C. agronomist Dr. Victor B. Youngner to assist with the ongoing undertaking.

Last April, the Council donated a like sum as the first installment to get the $6,000 project underway. Youngner is directing the research program with the aid of Dr. Victor A. Gibeault, U.C. Cooperative Extension horticulturist.

Both attended the Council's January meeting to accept the donation. Representing the SCTC in the presentation was President Alfred N. Nobel.

Following the ceremony, Nobel emphasized the Council would welcome any funds from industry or private sources to further promote turfgrass research sponsored by the organization.

Butz, Train Call for Cooperative Effort In Applicator Training, Certification

EPA Administrator Russell E. Train and Secretary of Agriculture Earl L. Butz have announced the signing of an interagency cooperative agreement calling for Federal, State and local cooperation in the training and certification of pesticides applicators. The agreement will help to implement existing regulations concerning certification of applicators.

"This agreement will provide policy guidelines to regional, State and local agencies to promote the development of applicator training programs, by bringing Federal, State and local resources to bear on this activity," Train said. "These programs will help to insure both that restricted pesticides are used safely and that agricultural productivity is maintained."

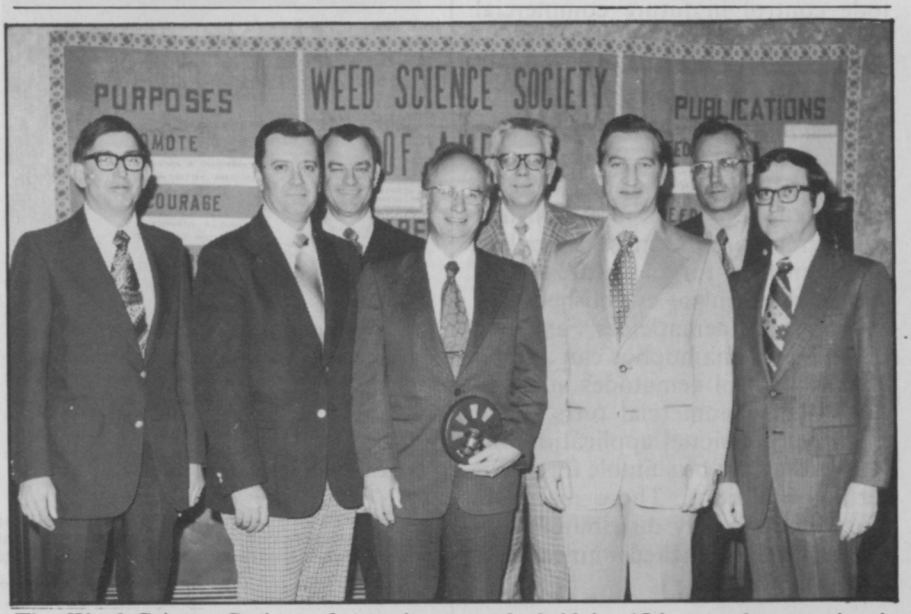
"The Department of Agriculture's Extension Service will work closely with EPA to assist the States' Cooperative Extension Services in implementing training programs," said Secretary Butz. "The Extension Service is the basic educational arm of the Department of Agriculture; therefore, its personnel and resources will be a vital part of our cooperative effort to train applicators in the safe use of pesticides."

EPA said applicator certification is a positive effort to insure the safe and proper use of potentially hazardous or environmentally damaging products. The Agency also noted that certification may permit continued use of those products which might otherwise have to be banned since they pose unacceptable hazards to people or the environment unless used by well-trained applicators.

Both Administrator Train and Secretary Butz believe that the training and certification program will help to maintain production while enhancing environmental protection. "We have a natural alliance here," Train said. "The present agreement will do much to lessen the risk of pesticide misuse which might otherwise threaten both of our efforts."

EPA estimates that domestic

(continued on page 42)



The Weed Science Society of America recently held its 15th annual convention in Washington, D.C., with more than 800 weed scientists attending. Officers elected for the coming year are (from left): Dr. T. J. Sheets, WSSA editor; Dr. F. W. Slife, president-elect; Dr. Will D. Carpenter, treasurer; Dr. C. R. Swanson, president; Claude Cruse, executive secretary; Dr. C. L. Foy, vice president; Dr. Ellery L. Knake, 1974 president; and Dr. G. R. Miller, secretary.

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Meeting Dates

RCGA and Canadian Golf Superintendents Association, national turfgrass conference and show, Skyline Hotel, Toronto, Ont., March 18-20.

Western Society of Weed Science, annual meeting, Del Webb Townhouse, Phoenix, Ariz., March 18-20.

Canada Chapter, ISTC, annual meeting, Four Seasons Sheraton, Toronto, Ontario, March 19-22.

National Club Association, annual conference, Shoreham Hotel, Washington, D.C., April 13-15.

Southern California Horticulture and Turfgrass Institute, Royal Inn, Anaheim, Calif., April 16-17.

Arizona Turfgrass Council, turfgrass equipment and materials show, Scottsdale Hilton Hotel, Scottsdale, Ariz., April 23.

Wyoming Recreation and Park Association, state conference, Lander, Wyoming, April 25-26.

Arizona Turfgrass Conference, Camelback Sahara Hotel, Phoenix, Ariz., May 7-8.

Western Chapter, ISTC, 42nd annual meeting, Riviera Hotel and Country Club, Palm Springs, Calif., May 11-14.

Florida Nurserymen and Growers Association, 1975 convention, Innisbrook Resort and Golf Club, Tarpon Springs, Fla., May 22-24.

American Sod Producers Association, summer convention and field days, Crown Center, Kansas City, Mo., July 16-18.

American Association of Nurserymen, centennial convention, The Palmer House, Chicago, Ill., July 19-23.

Penn Allied Nursery Trade Show, Hershey Motor Lodge and Convention Center, Hershey, Pa., July 29-31.

Illinois Landscape Contractors Association, Summer Field Day, Burr Oak Nursery, Round Lake, Ill., Aug. 6.

Canadian Parks and Recreation Association, annual conference, Quebec City, Quebec, Aug. 10-14.

Illinois Turfgrass Foundation, Golf Day, Indian Lakes Country Club, Bloomingdale, Ill., Aug. 25.

Pacific Horticultural Trade Show, San Diego Convention and Performing Arts Center, San Diego, Calif., Sept. 13-15.

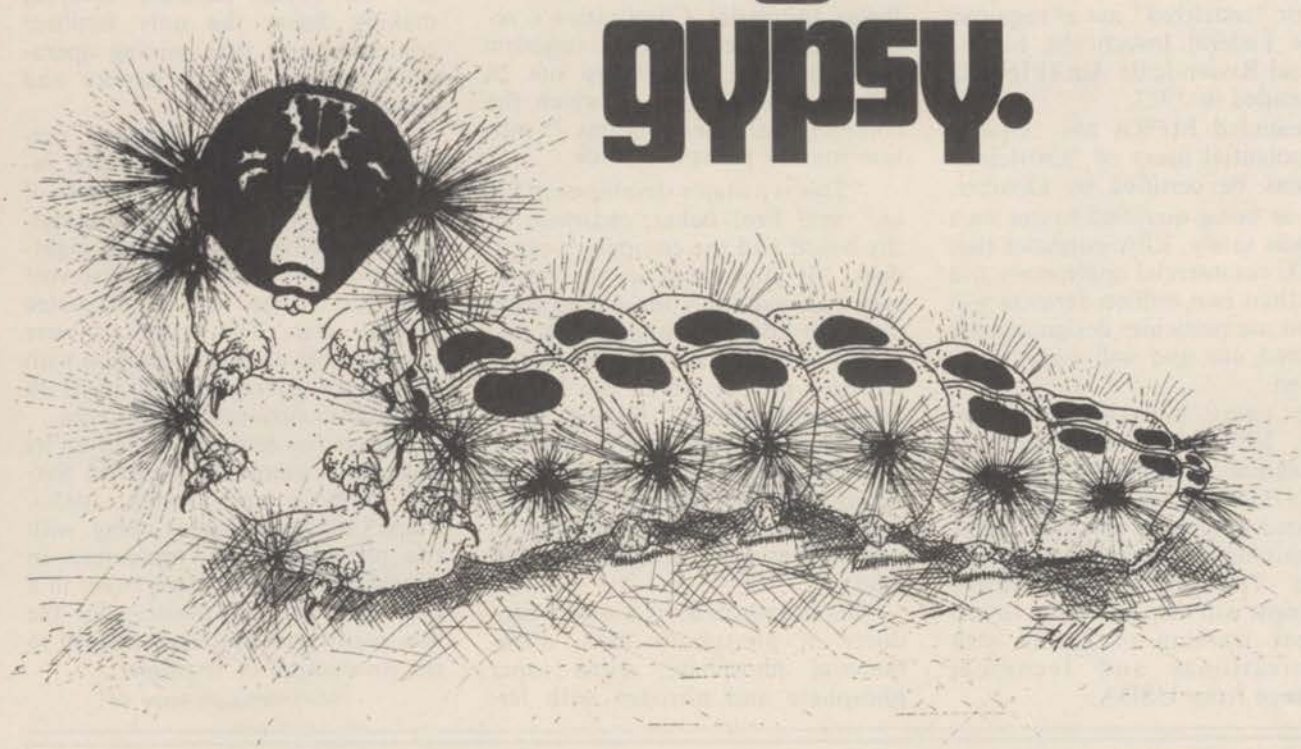
International Symposium on Environmental Monitoring, Frontier Hotel, Las Vegas, Nev., Sept. 14-19.

California Association of Nurserymen, convention, Town and Country Hotel, San Diego, Calif., Sept. 16-18.

Kentucky Turfgrass Council, conference and field day, Barren River State Resort Park, Lucas, Ky., Oct. 14-15.

26th Central Plains Turfgrass Conference, Manhattan, Kansas, Oct. 22-24.

no good gypsy.



The Gypsy Moth, an insect, which is capable of defoliating millions of acres of forest, parklands and wooded residential areas annually, can be stopped. A very effective biological agent, *Bacillus thuringiensis*, (B.t.) was discovered in the course of a search for new solutions to the defoliation problem. B.t. is specific for *Lepidoptera*, like gypsy moth, tent caterpillar and elm span worm, due to the alkaline nature of their digestive systems. Almost immediately after ingestion these target pests lose their desire to eat. In other words, defoliation ceases.

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consumption of pesticides now amounts to one billion pounds of active ingredients each year. These pesticides will be classified for "general" or "restricted" use as required by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended in 1972.

Amended FIFRA also requires that potential users of "restricted" products be certified by October, 1976, as being qualified to use such products safely. EPA estimates that 100,000 commercial applicators and more than two million farmers will need to use pesticides designated for restricted use and will have to be certified.

To carry out these requirements, EPA issued standards for certification of applicators on Oct. 9, 1974. On Jan. 13, 1975, the Agency issued guidelines for State plans for training and certifying applicators. The present cooperative agreement will help the States to implement training programs with organizational and technical assistance from USDA.

Zoning Exception for Beker Opens Door to Florida Mine

The Manatee County Board of County Commissioners, Bradenton, Fla., unanimously approved Beker Industries Corporation's request for a special zoning exception for mining an 11,000-acre site 26 miles east of Bradenton which the company estimates contains 75 million tons of phosphate rock.

"This is a major development for us," said Erol Beker, chairman of the board and the company's president. "It guarantees us the necessary raw materials for our existing plants in Louisiana and Illinois and makes possible the expansion of our fertilizer production in the United States and abroad." Project work will begin immediately and the mine will be designed to produce three million tons per year of phosphate rock and should be completed in mid-1977 at a cost of more than $50 million.

Beker Industries is a major producer of phosphoric acid, diammonium phosphate, triple super phosphate and nitrogen with fertilizer plants located in Louisiana, Illinois, Idaho, New Mexico and Canada. Beker's extensive phosphate rock deposits and mining operations in Idaho supply the rock for the Idaho fertilizer complex making Beker the only fertilizer company with rock mining operations located in both eastern and western markets.

If Florida, the company presented mining proposals which include simultaneous reclamation of the property along with the construction of an approximate eight-billion-gallon fresh water reservoir for the citizens of the Manatee County area. The proposals were developed in close consultation with local area government officials to meet all environmental concerns.

Beker has recently started up its anhydrous ammonia plants in Sarnia, Ontario and Conda, Idaho. These nitrogen plants, along with the phosphate rock operations in Florida and Idaho, place Beker in a basic raw material position for the two major raw materials needed in the production of fertilizer.

(more news on page 44)

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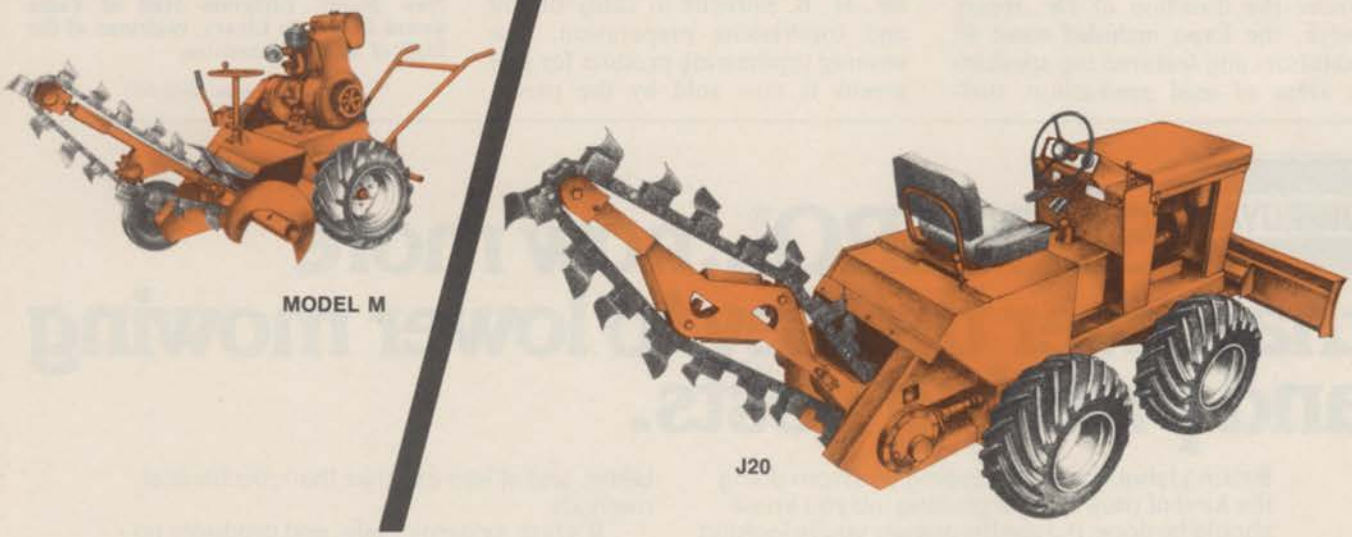

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Turfgrass Shows Changing, So Are Attendance Figures

Regional turfgrass meetings and conferences are becoming increasingly popular as the expense of long-distance travel reaches a peak.

The national and international conferences that once supplied nearly all educational materials, equipment updates and chemical information are being challenged for effectiveness in the turfgrass industry. As a means of survival, several regional organizations have broadened their annual programs into extremely worthwhile and informative meetings.

The New Jersey Turfgrass Association recently wrapped-up a complete exposition — equipment show and educational session — for what appears to be the first in a long series of healthy turfgrass shows. Under the direction of Dr. Henry Indyk, the Expo included some 44 exhibitors and featured top speakers in areas of seed production, turfgrass maintenance, fertilizer and equipment.

The Expo, which attracted over 500 people, was a new experience for New Jersey's traditional turfgrass show. And one of the newest and most successful experiences was the Hall of Fame Award.

The award, presented at the Expo was in recognition of James Smith, Sr.'s many years of service and accomplishments.

Smith, whose career has been associated with more than two generations of turfgrowers, was born in Scotland and came to America as a young man.

His Scottish background and interest in golf aroused his curiosity about turfgrass growing problems. He noticed the need for a quality topdressing material for putting greens. This led him to the Agronomic Science Department of Rutgers University where he spent many hours in the laboratory with Dr. H. B. Sprague in study of soil and topdressing preparation. The ensuing topdressing product for golf greens is now sold by the parent company beyond New Jersey as far away as Maryland, Eastern Pennsylvania, Albany, New York, Western Connecticut and Long Island.

James Smith, Sr. (right) receives the first New Jersey Turfgrass Hall of Fame award from Leo Cleary, chairman of the Hall of Fame Committee.

(more news on page 50)

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Roadside Grass Control. Slo-Gro is recommended for use on all "commercial" turf areas that require regular maintenance, but are difficult to mow. Maintenance situations like highway medians, airfields, steep embankments, ditches, and grassed areas around fences and guard rails.

Growth Control on Trees. Slo-Gro inhibits tree growth by stopping the terminal growth of woody plants. Primary applications include control of tree size under power lines, along streets, or wherever excessive foliage is a problem.

Golf Course Maintenance. While Slo-Gro is not recommended for general use on fine grass areas such as residential or commercial lawns, it has been used extensively on golf course roughs. It can also be used in conjunction with herbicides wherever weed control is required.

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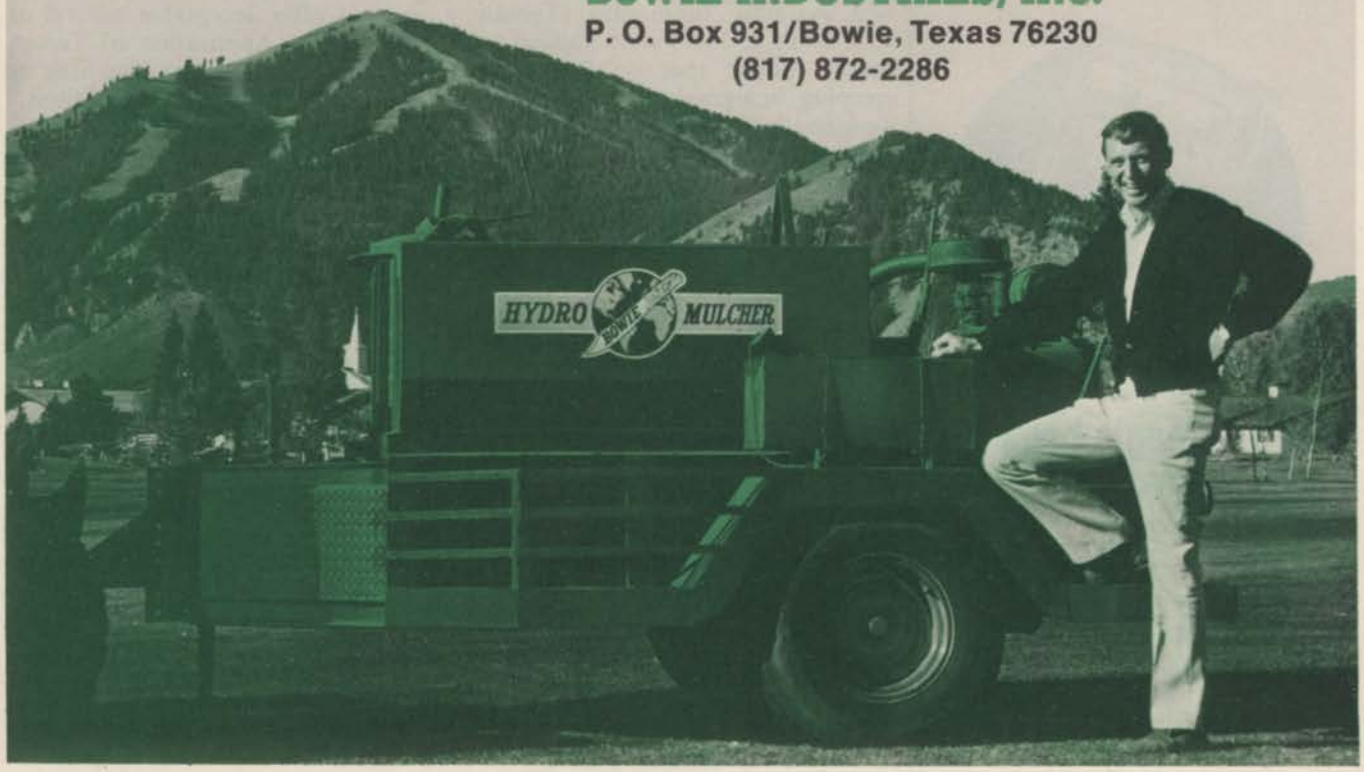

For More Details Circle (112) on Reply Card

DOLLAR SPOT CONTROL
Integrating Systemics and Contacts

By P. O. LARSEN

The author is an associate professor in the Department of Plant Pathology at The Ohio State University, Columbus, Ohio, specializing in teaching and research in the area of turfgrass diseases.

SCLEROTINIA DOLLAR spot is a serious disease of bentgrass and may also be severe on other turfgrass species. The disease is caused by a fungus, *Sclerotinia homoeocarpa*, that overwinters in the crowns and roots of infected plants. The fungus does not begin to grow optimally until air temperatures have reached 70 to 80 degrees F. and the atmosphere is moisture saturated. The tan- to straw-colored spots of blighted grass, two to three inches in diameter — characteristic symptoms of the disease on bentgrass putting greens — generally appear shortly after the fungus begins active growth.

Although certain management practices, such as increasing nitrogen fertility and holding soil moisture at field capacity, have been shown to reduce dollar spot severity, it is generally necessary to apply fungicides to maintain satisfactory control of the disease on high maintenance turfgrass areas. A number of contact and systemic fungicides have been registered for control of dollar spot. Anilazine (Dyrene), chlorothalonil (Daconil 2787), thiram (Spotrete, Tersan 75), cycloheximide (Acti-dione) and cadmium chloride (Caddy) are examples of contact fungicides that are known to effectively control the dollar spot fungus.

Recently, the systemic fungicides benomly (Tersan 1991), thiabendazole (Mertect 140), thiophanate methyl (Spotkleen, Fungo), and thiophanate ethyl (CL 3336) have been used extensively in dollar spot control programs. This article deals with recent reports where systemic fungicides have failed to control *Sclerotinia* dollar spot because of the development of fungicide-tolerant fungal strains.

Figure 1 graphically illustrates the results of a fungicide trial in which three protectant fungicides (Caddy, Daconil and Dyrene) and two systemic fungicides (Tersan 1991 and CL 3336) were applied to control dollar spot on Penncross creeping bentgrass. The fungicides were applied in five gallons of water per 1,000 square feet on 10 by 10 foot plots. Applications were made at two week intervals beginning July 12, 1974. Disease was measured by counting the number of dollar spots per plot area. All of the fungicides tested eventually provided excellent control of the fungus.

Another fungicide trial was initiated on June 10, 1974, in the Columbus, Ohio, area on a Washington creeping bentgrass putting green where control of dollar spot with application of benomyl has been unsuccessful in the past. The systemic fungicides benomyl (Tersan 1991) and thiophanate ethyl (CL 3336), and the contact fungicides thiram (Spotrete), cycloheximide (Acti-dione TGF), anilazine (Dyrene), and chlorothalonil (Daconil 2787) were applied as foliar sprays every two weeks at the manufacturers' recommended rates (see Figure 2).

The fungicides were applied in five gallons of water per 1,000 square feet on four by four foot plots. Dyrene and Daconil 2787 provided excellent disease control, while Acti-dione and Spotrete suppressed the disease symptoms but did not offer acceptable control of the fungus. Application of Tersan 1991 and CL 3336 provided little or no control under these conditions.

Recently, researchers at Pennsylvania State University have re-

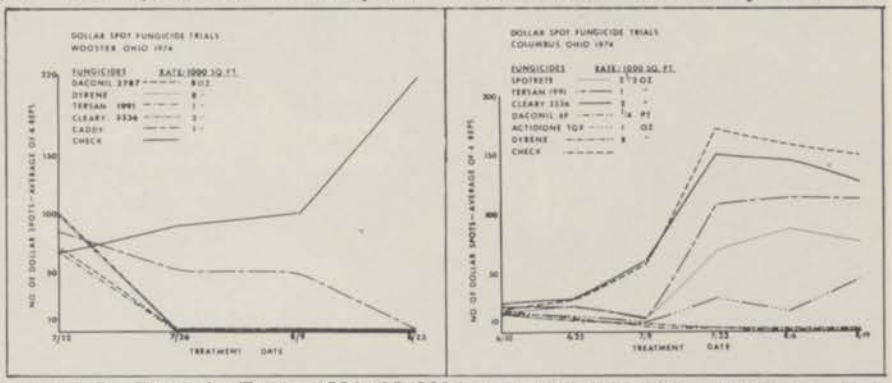

Fig. 1 (left): Systemic (Tersan 1991, CL 3336) and contact (Daconil 2787, Dyrene, Caddy) fungicides were applied as foliar sprays for control of dollar spot on Penncross creeping bentgrass. Disease was measured by counting the number of dollar spots per plot. All fungicides eventually provided excellent control. Fig. 2 (right): Systemic (Tersan 1991, CL 3336) and contact (Spotrete, Daconil, Acti-dione TGF, Dyrene) fungicides were applied as foliar sprays to plots of Washington creeping bentgrass where systemics had previously failed to control dollar spot. Dyrene and Daconil provided excellent control; Acti-dione and Spotrete suppressed but did not control disease to acceptable levels. Tersan 1991 and CL 3336 provided little or no disease control.

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ported similar instances in which systemic fungicides failed to control dollar spot.[1,2] This observation has now been made in several states, indicating that tolerance of *S. homoeocarpa* to systemic fungicides is quite widespread.

In an effort to explain the occasional failure of systemic fungicides to control dollar spot, *S. homoeocarpa* was isolated from plots where systemic fungicides did not control the disease and from areas where systemic fungicides were effective. These isolates were cultured in the laboratory on artificial growth media containing various systemic and contact fungicides. *Sclerotinia* isolates from plots where systemic fungicides controlled disease would not grow on media containing systemic and contact fungicides that are registered for dollar spot control (see Figure 3A). Isolates originating from areas where systemic fungicides did not control disease grew readily on media containing systemic fungicides (see Figure 3B). These observations indicate that failure to control the fungus on the turfgrass plots with systemic fungicides was probably caused by the presence of a fungicide-tolerant strain of *S. homoeocarpa*.

Another example of tolerance of fungal turf pathogens to systemic fungicides has been demonstrated with the powdery mildew fungus, *Erysiphe graminis*, on Kentucky bluegrass.[3] A strain of the fungus was removed from a field plot of Merion Kentucky bluegrass where benomyl applications failed to control powdery mildew. This strain proved to be resistant to benomyl, thiabendazole and thiophanate methyl at concentrations that were not phytotoxic. The development of benomyl-tolerant strains of fungal pathogens has also been recorded for crops other than turfgrasses.[4,5,6]

Fungal strains that have been reported to be tolerant to benomyl were also tolerant to the thiophanate fungicides. This result is understandable, since it has been shown that both benomyl and thio-

(continued)

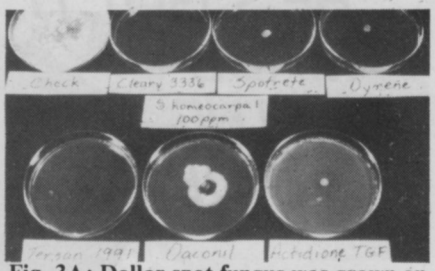

Fig. 3A: Dollar spot fungus was grown on artificial media containing 100 ppm active ingredient of systemic (CL 3336, Tersan 1991) and contact (Spotrete, Dyrene, Daconil, Anti-dione TGF) fungicides. Fungus was isolated from turfgrass where systemics effectively controlled dollar spot. No fungal growth observed with systemics.

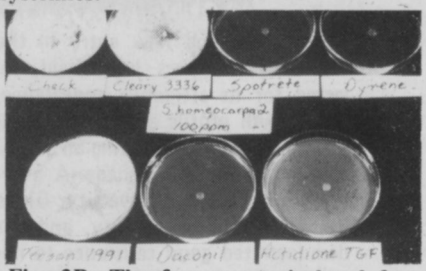

Fig. 3B: The fungus was isolated from areas where systemic fungicides did not control disease. Fungal growth was not inhibited on media containing systemic fungicides.

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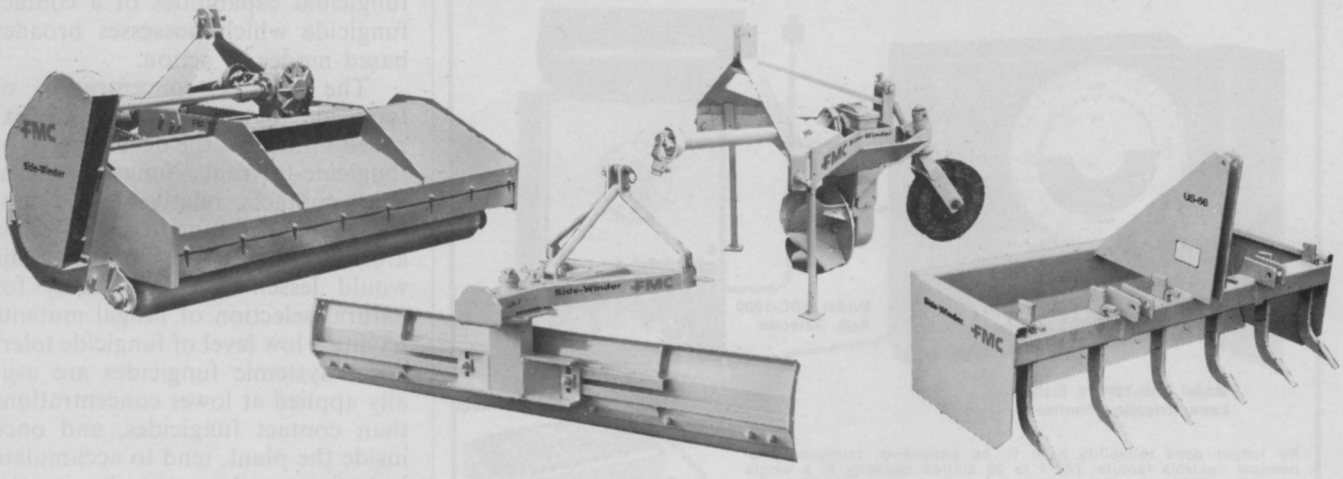

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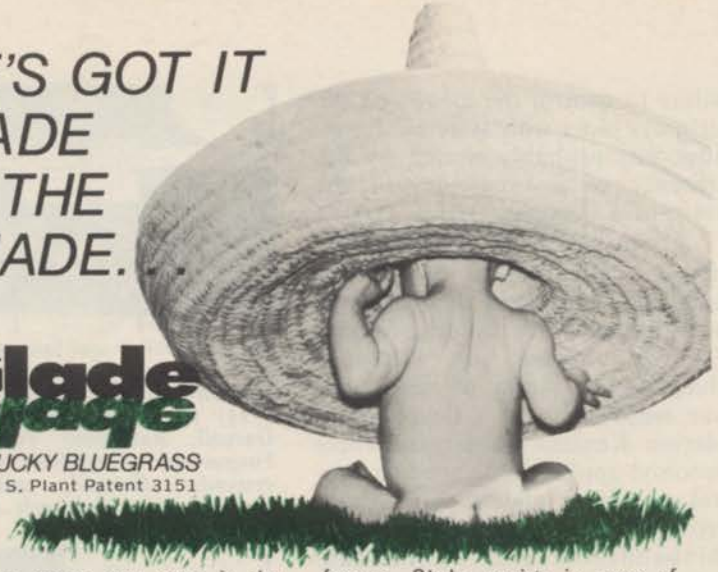

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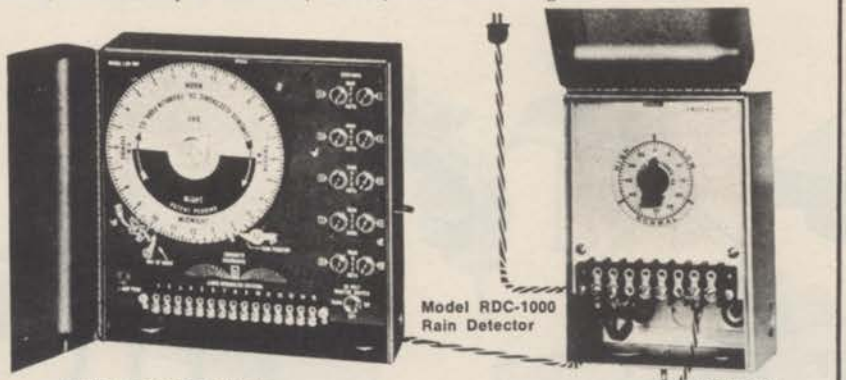

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phanate methyl are converted to the same compound, 2-benzimidazole carbamic acid methyl ester, in plants,[6,7] and are quite similar with respect to their ultimate fate and modes of action in plant tissue.

Strains of *S. homoeocarpa* tolerant to Dyrene and cadmium fungicides have been reported,[2,8] indicating that fungicide tolerance is not strictly limited to the systemic fungicides. However, tolerance to systemic fungicides has been reported more often than tolerance to contact fungicides.

Various explanations have been offered for the fact that tolerance to systemic fungicides develops more frequently than tolerance to contact fungicides. Contact fungicides generally are active at several sites in the metabolism of the fungi they inhibit, whereas systemic fungicides are usually only effective at one or a few specific sites in the metabolic pathways of a fungus. This characteristic increases the potential for fungicide tolerance to develop with systemics, since only one or a few mutations in the fungus at chromosome sites governing fungicide sensitivity could render it insensitive to systemic fungicidal action. Mutations at several chromosome sites would be required to change the fungicidal capabilities of a contact fungicide which possesses broader based modes of action.

The relative concentration of fungicide to which a fungus is exposed influences the development of fungicide-tolerant fungal strains. With contacts, relatively high concentrations of fungitoxic materials are found on the leaf surface. This would lessen the opportunity for natural selection of fungal mutants having a low level of fungicide tolerance. Systemic fungicides are usually applied at lower concentrations than contact fungicides, and once inside the plant, tend to accumulate in leaf tips and margins, leaving the central leaf areas relatively free of fungicide. This uneven distribution of fungicide enhances the potential for development of fungal types having tolerance to low concentrations of fungicide.

Systemic fungicides do not cause mutations to occur in the normal fungus populations. Instead, the mutations occur in a random fashion. Reproduction in fungi oc-

curs much more rapidly than with higher plants and animals and, therefore, the opportunity for random mutations occurring is increased. This encourages the natural selection of fungal mutants possessing tolerance to systemic fungicides. Furthermore, the occurrence of random mutation at several fungal chromosome sites, resulting in tolerance to contact fungicides, would be less likely than mutation at one or a few sites, resulting in tolerance to systemics.

If it is determined that fungicide-tolerant strains of *Sclerotinia* are present in a turfgrass area, it is recommended that further use of systemic fungicides to control dollar spot be discontinued. An alternate contact fungicide should be chosen that can effectively eliminate the tolerant form of the fungus over a period of time.

When fungicide-resistant fungi have not been observed with dollar spot, it is suggested that alternate applications of systemic and contact fungicides registered for dollar spot control be used in an integrated control program to prevent the build-up of fungicide-tolerant fungus strains. The systemic fungicide will continue to eliminate the majority of the dollar spot fungus population that is sensitive to systemics, while the contact fungicide will be used primarily to prevent the build-up of systemic fungicide-tolerant strains of *S. homoeocarpa*.

The systemic fungicides have proven to be extremely effective and valuable tools for plant disease control and have a number of advantages over the contact fungicides: the interval between applications is generally longer with systemics; systemics are translocated inside the plant and have a curative effect, whereas the contacts are on the plant surface and are preventive; and, since systemics are internal, they are less vulnerable to wash-off or to inactivation by sunlight than are the contact fungicides.

When systemic fungicides are used wisely in an integrated control program alternated with broad spectrum contact fungicides, the opportunity for build-up of fungicide-tolerant fungal populations will be minimized and the advantages of using systemic fungicides may be realized.

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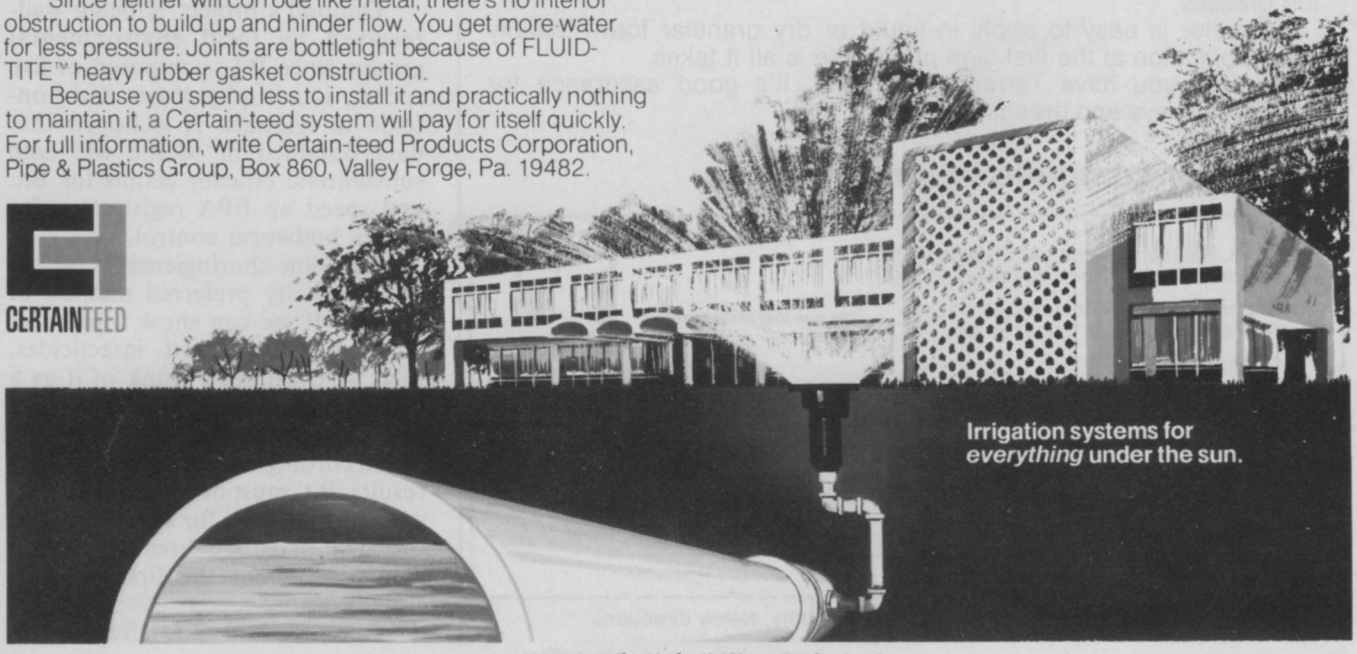

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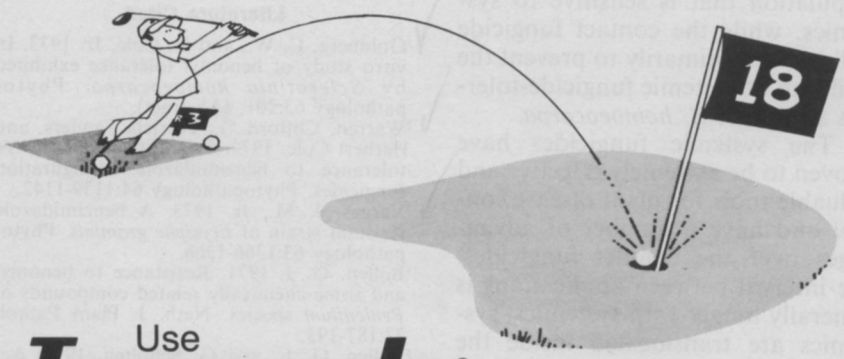

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NEWS *(from page 44)*

Budworm Target of Maine's Bacillus Thuringiensis Tests

Biological insect control may be put to an important test this spring as the Maine Agricultural Experiment Station plans to combat a massive outbreak of spruce budworms in the northern part of that state with aerial applications of *Bacillus thuringiensis* (B.t.).

According to John Dimond, a professor of entomology at the University of Maine who is heading up the project, present plans call for at least six 1,000-acre test plots using six-, eight- and 10-billion international units of B.t., each applied at rates of one-quart and one-half gallon per acre.

The spruce budworm outbreak, which also afflicts much of the eastern Canadian provinces, is Maine's most serious insect problem. The budworms have infested 5.5 million acres of spruce/fir forests in Maine, 3.5 million of which are serious enough to warrant immediate attention.

Since a budworm outbreak in the late 1950's, the State Department of Forestry has conducted regular spraying programs using Zectran, and experimental use of Sevin last year. The State plans to spray again late this spring, probably also using fenitrothion. The B.t. project test plots will be established in the same general area as the State's control program.

Dimond's project is being well-received by local environmental groups since B.t., composed of live spores, is non-phytotoxic and non-toxic to animals. It is hoped that data obtained in Maine will help substantiate efficacy claims for B.t. and speed up EPA registration for spruce budworm control.

"Bacillus thuringiensis is an environmentally preferred method of control. If we can show it to be as effective as chemical insecticides, then we'd certainly think of it as a preferred material to use," Dimond said.

According to Dimond, for best results, B.t. must be applied early, so current plans call for spraying when the tree buds are breaking which would be about the first week of June.

Dimond said B.t. effectiveness

can be measured in two ways. "We'll take a pre-spray and a post-spray count of insects and thus be able to determine the percent mortality," he said.

"After the feeding of the budworms, we'll also take defoliation measurements," Dimond explained. "If we can save 50 percent or more of the foliage, the trees will probably live."

The project will mainly involve testing of Abbott Laboratories' B.t., trade-named Dipel. Depending on funding, Dimond said plans may also include testing of Thuricide, another B.t. brand from Sandoz, Inc.; Orthene, an organic phosphate compound from Chevron; Lannate, a carbamate product from DuPont; Cygon, an organic phosphate insecticide-acaricide from American Cyanamid Co.; and a product from Thompson Hayward known as TH640.

New York Arborists Group Elects '75 Officers, Directors

At the annual meeting of the New York State Arborists Association in Syracuse, N.Y., officers for 1975 were elected. Carl Lundborg was re-elected president of the Association. He is a vice president of the F. A. Bartlett Tree Expert Company with headquarters at Westbury, N.Y.

Three vice presidents were also elected: first vice president, D. W. Cadwallader of Hopewell Junction, N.Y.; second vice president, Richard Wickey of Westbury, N.Y.; and third vice president, Jacob Bruinooge of Spring Valley, N.Y. James W. Taylor of Gardener, N.Y., was elected secretary-treasurer.

On the board of directors, Jack A. Schultz of Merrick, N.Y. will serve a one-year term as will Dave Kress of Schenectady, N.Y., and Sam Blakley of Mt. Vernon, N.Y. For two-year terms, Philip Brogan of Syracuse, N.Y., and Leo Cook of Vestal, N.Y., were chosen. For three-year terms, the Association selected Raymond Smith of Buffalo, N.Y., and Vincent Cirasole of Bayside, N.Y.

Margaret Herbst, with headquarters at 101 Park Ave., N.Y., N.Y., was reappointed executive secretary.

(more news on page 52)

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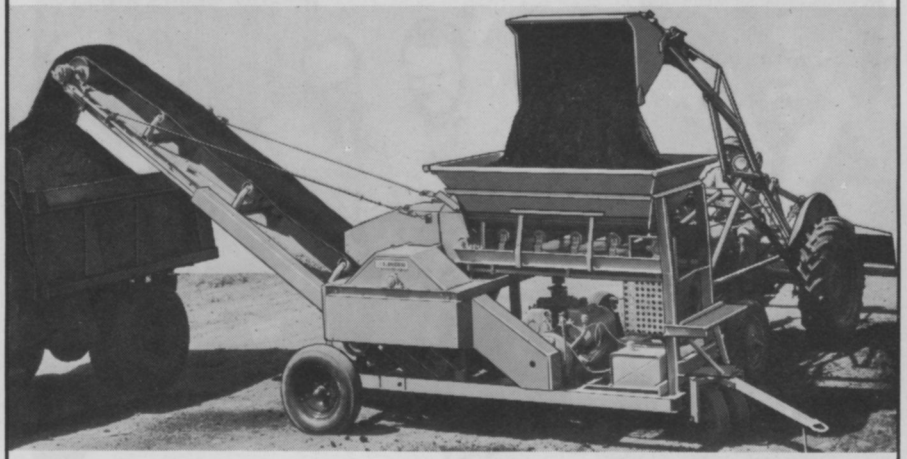

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The Southern Weed Science Society elected new officers for the coming year at the Society's recent 28th annual meeting in Memphis. New officers are: (Standing, from left) L. McCormick, Louisiana Extension Service, Baton Rouge, La., member at large; William G. Westmoreland, Ciba-Geigy Corp., outgoing president; Roy J. Smith, USDA-ARS, Stuttgart, Ark., member at large; Wayne Wright, Dow Chemical Co., member at large; Dr. Robert Frans, University of Arkansas, constitution and operating procedures chairman; (seated, from left) Dr. J. B. Weber, North Carolina State University, editor; Dr. Paul W. Santelmann, Oklahoma State University, president; Dr. A. J. Becton, Funk Seeds International, president-elect; Dr. Gale Buchanan, Auburn University, vice president; and Dr. Howard Greer, Oklahoma State University, secretary-treasurer.

Air Products Expands With 250 Ton/Day Ammonia Plant

Air Products and Chemicals, Inc., said it will expand ammonia production capacity at the company's New Orleans, La., facility with the addition of a 250-ton per day ammonia plant. This new capacity is expected to be on stream in January, 1976.

Ammonia is expected to continue in worldwide short supply into the late seventies. The United States produces about 16 million tons of ammonia annually. Approximately 75 percent of domestic consumption is used in fertilizer products.

Since a grass roots ammonia facility could take approximately three years to complete, Air Products purchased certain idle ammonia production equipment which is being used in this expansion. These otherwise long lead time items will make it possible for the new plant to be in production in approximately one year.

(more news on page 54)

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Turf Fertilizer Supplies O.K. But Prices Higher Than '74

Fertilizer supplies for home lawns, golf courses, and parks should be adequate this spring but higher in price than last year, said a faculty member of the College of Agriculture at The Pennsylvania State University. Dr. Donald V. Waddington has studied the situation and reported his findings at the 45th Michigan Turfgrass Conference held recently in East Lansing, Mich.

A check of typical turfgrass fertilizers showed price increases of 60 to 67 percent since last spring and 29 to 35 percent increases since last July, he said.

As an example, a 10-6-4 fertilizer with 25 percent slow-release nitrogen increased from $130 per ton in the spring of 1974 to $162 in July, 1974, and then to $212 by January of this year. Obviously, rising costs for materials and manufacturing are passed along to buyers.

Describing increased costs for two special slow-release nitrogen fertilizers, ureaform and IBDU, Waddington said ureaform prices have increased by about 60 percent in the last two years, while costs for IBDU have doubled. In studying the fertilizer market, Waddington, associate professor of soil science at Penn State, contacted representatives of major turfgrass fertilizer manufacturers and some of the largest distributors in Pennsylvania.

According to one manufacturer, the homeowner who paid about $8.80 in 1972 to fertilize an average lawn of 8,000 square feet will be faced with $14.40 for one application of the same material in 1975. Two or three applications a season are generally recommended. Thus, some fertilizer suppliers expect a decline in buying by the average homeowner.

People who buy in large quantities, such as superintendents of golf courses and parks, may not always get the exact fertilizer grade or ration they want and deliveries may be delayed, Waddington said. If delivery is delayed, be prepared to pay the price being asked at delivery

(continued on page 60)

BACILLUS THURINGIENSIS:

Its Properties And Manufacturers

B.t. is a natural bacterium, *Bacillus thuringiensis.*

When gypsy moths or other caterpillars ingest foliage sprayed with B.t., their digestive mechanisms are disrupted and the pests immediately stop feeding. Death follows from within three hours to three days.

Unlike the organic chemical insecticides, this compound controls only Lepidopterous larvae — the group which includes worms such as gypsy moths, tent caterpillars and inchworm. It is not harmful to desirable insects, animals, fish, humans or plants.

Larvae which have died are not dangerous, either. Tests have shown that birds and other predators readily eat and thrive on sprayed larvae.

B.t. is manufactured as Thuricide by Sandox Wander; as Dipel by Abbott Laboratories, Chicago, Ill.; and as Biotrol XK by Thompson Hayward.

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NOTION *(from page 10)*

Northeast, there have been breakouts in Michigan, West Virginia, Maryland, Florida, and even in California, according to the U. S. Forest Service.

Most of the newly invaded areas have not suffered significant damage as yet, but in Michigan the infestation was heavy enough to warrant spraying with insecticides over several thousand acres, and a spray program was launched in two counties in Maryland last year. Some authorities are afraid that heavy damage may occur in the next few years to the hardwood forests south of the present infestation belt unless preventive measures are taken.

What about the future? To quote the current U. S. Forest Service Report: "One can speculate that, as the gypsy moth is introduced into new areas to the south and west, it will be successful because of an abundance of favored food and a relatively low control exerted by native parasites and predators. Apparently no climatic or geographic barrier exists to inhibit the spread of the species. . . . The gypsy moth might eventually extend its range in this country to include over 100 million acres." Oak and other trees favored by the gypsy moth caterpillars, the report points out, prevail in the southern Appalachians, Tennessee, the Ozarks and hugh areas of the Midwest, offering conditions highly favorable to the gypsy moth.

Attempts to control the persistent pest by a variety of methods date back to 1891. There were times when the control programs were so successful that authoriites felt the gypsy moth had been eradicated, but new infestations occurred nevertheless and the areas affected increased, ultimately including every state in the northeast.

Cooperative State/Federal programs directed against the gypsy moth began in 1932. DDT, introduced in 1944, was highly effective, but was phased out in 1968 because of its long-lasting residue, which had adverse effects on the total environment.

In the search for alternatives, experimentation with biological or microbial insecticides was launched in the 1960's. Unlike most chemicals, microbial insecticides are specific in their action. That is to say, they will kill the target pest when used properly without harming beneficial insects, birds, fish and wildlife.

Each gypsy moth egg mass is capable of hatching up to 500 caterpillars. The newly hatched larvae seldom feed, thus application should be made during the second or third instar stage.

A very effective biological agent, Bacillus thuringiensis, (B.t.) was discovered in the course of the search for new solutions to the defoliation problem. B.t. is a bacterium which is cultered to produce spores and crystals. It is this crystalline body that has a toxic effect on the gypsy moth caterpillar.

B.t.'s mode of action is unique;

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after ingestion, enzymes in the insect's gut hydrolize the protein crystals and immediately affect the caterpillar's metabolism. B.t. is relatively specific for Lepidoptera, like gypsy moth, cankerworm, fall webworm and tent caterpillar, due to the alkaline nature of their digestive systems.

Within 30 minutes after ingestion of B.t., the insect's gut wall is badly disorganized, but even before that happens it loses its desire to feed. The fragmented protein perforates the gut wall, and at the same time, the pH in the gut falls to a level at which the B.t. spores can germinate. There ensues a rapid multiplication of the bacteria and the insect dies of septicemia.

The important thing is that feeding stops almost immediately after ingestion of B.t. although the insect may continue to live for hours or days afterwards. In other words, defoliation ceases.

B.t., sold commercially under the trade name THURICIDE, is produced by Sandoz, Inc., Crop Protection, Homestead, Florida.

Through continued research and development, Sandoz has brought to the market thuricide 16B, designed specifically as a low-volume aerial spray against the gypsy moth and other forest caterpillars. This formulation has consistently given 75 to 90 percent foliage protection from gypsy moth caterpillars when properly applied. Application costs can be reduced, since this easy-to-use liquid can be loaded aboard an aircraft, undiluted, or premixed 1:1 with water at the spray site without expensive mixing equipment or addition of adjuvants.

In the spring, application should begin when leaf expansion has reached a minimum of 20 to 30 percent of normal growth, to ensure sufficient leaf surface upon which to deposit the bacteria. A gypsy moth egg hatch often may occur over a period of several weeks, usually in mid-April to early-May. During this period, young, newly hatched gypsy moth caterpillars seldom feed until the second instar stage. Thus, application is most effective when timed to coincide with second and third instar larval development and maximum leaf or foliage expansion. Spray applications applied too early will likely make a second application necessary, while late applications result in excessive leaf injury.

Thuricide 16B should be applied at the rate of 1-2 quarts per acre, either undiluted, or diluted in water at a 1:1 ratio, depending upon the capabilities of the aerial application equipment. Either rotary or fan type nozzles arranged on a spray boom, consistent with the aircraft capabilities and calibration desires, have been proven effective. Spray droplets, ranging in size from 80 to 300 microns are satisfactory, but average mean diameter should be kept in the range of 80 to 120 microns (for optimum deposit.) Spray adjuvants or additives are not required in any case.

If egg hatch occurs over a long period of time, two applications may be required as with most other commonly used insecticides. □

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'ADELGIDS' *(from page 32)*

teresting group of insects because of their bizarre life histories and host relationships. All of them feed exclusively on conifer bark or needles. Most of them have very complicated life cycles during which two to eight distinctly different morphological forms can occur.

Many adelgids are capable of causing gall formation and spend one phase of their cycle inside these induced plant structures. Galls are formed only on spruce and their form varies according to the species of adelgid which stimulates their production. On other hosts adelgids are free-living and are typically protected by white wooly wax which they produce.

Nearly all species of adelgids infest different host genera during certain parts of the complete life cycle. Some forms reproduce sexually and others are entirely female and produce offspring from unfertilized eggs. Each species of adelgids has specific hosts and the various forms are produced only on the appropriate host. One form serves the function of dispersal to the alternate host.

The galls formed on spruces can be aesthetically objectionable and, if numerous, can result in disruption of the symmetry which is frequently desirable in landscape plants. The free-living forms which feed on needles cause discoloration, distortion and premature needle drop. Adelgids which feed on the tender bark of new shoots frequently cause stunting and distorted growth. Some species, such as balsam woolly aphid, severely injure trees and, if numerous, can cause tree mortality. Individual trees vary in their susceptibility to adelgid attack, some suffer repeated severe attacks and others are essentially resistant.

The two most common adelgids in ornamental plantings are Cooley spruce gall aphid (CSGA) and eastern spruce gall aphid (ESGA). Both can be found in any part of the world where their hosts occur. Discussion of their life histories will illustrate the diversity to be found in this group of insects.

CSGA induces galls on spruces, mainly Colorado blue, Sitka, and Englemann. It also feeds on the needles of Douglas-fir. The galls are terminal on new growth, green through the summer when the adelgids are active inside and then brown after the adelgids leave in late summer. There are six forms of individuals in the complete cycle of CSGA — two found only on the bark of spruce twigs, one which develops within the galls and then moves to other twigs of the same tree or flies to another spruce or to Douglas-fir, two found only on the needles of Douglas-fir and one which develops on Douglas-fir needles and then flies to spruce. One of the two forms of spruce twigs is the sexual state, the other five are all parthenogenetic. These six forms are all different in structure and habit.

ESGA is known only from Norway spruce and white spruce and has only two morphological forms; one is free-living on bark twigs and the other develops withing galls which are basal on new growth and open to release the inhabitants in late summer or early autumn. These move to other branches or to other trees. Both forms of ESGA are parthenogenetic.

About 20 additional species of adelgids are known to occur in the United States. Various ones cause galls on all species of spruce and the free-living forms are found on larch, hemlock, fir and pine.

Control studies in Ohio, Maryland, Pennsylvania and Washington have shown that prevention of galls on spruce can be accomplished by a thorough application of insecticide in the autumn, sometime between the time the old galls open and the first frost. This generally gives at least six weeks leeway and can be easily scheduled.

Endosulfan at 0.5 lb. active ingredient per 100 gallons of spray or carbaryl (the only carbamate registered for CSGA and ESGA) at one lb. active ingredient per 100 gallons are most effective. The free-living forms can be controlled by the same insecticides whenever they are present. Of course, if new foliage is to be protected, insecticide application must be made before damage occurs, and should be applied shortly after bud break. Repeated applications in the same season are almost never necessary.

While these two materials have Environmental Protection Agency approval for control of adelgids, an applicator should always check local regulations, insecticide labels, and State recommendations before applying them. □

Table 1.

Type	Material	Lb. AI/100	% reduction from untreated check
carbamate	carbaryl	1	99
phosphate	parathion	0.5	44
phosphate	malathion	1	0
systemic carbamate	aldicarb	*	100
systemic carbamate	carbofuran	1	96
systemic phosphate	monocrotophos	1	0
chlorinated	endosulfan	0.5	97

*6 g. AI/in. d.b.h. applied to the soil.

Table 1 illustrates selected results from several experiments.

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NEWS *(from page 54)*

time rather than at ordering time, he said.

Waddington suggested several ways to cut fertilizer costs. Quick-release or soluble fertilizers furnish nitrogen at lower costs than the slow-release types. If a switch to solubles is made, adjust the rate and timing of use to avoid fertilizer burn or overstimulation of growth from quick-release fertilizers.

In buying different fertilizer grades with the same ratio of nitrogen, phosphorus, and potash, a higher analysis such as 16-8-8 is normally a better buy than the same ratio at 10-5-5. This is due to a lower cost per unit of plant food, less material for handling and storage, and lower shipping costs.

Dry products are less costly than liquid fertilizers, Waddington said. Blends may be lower priced than granular or pelleted fertilizers. However, separation of materials due to size or density differences is a problem with some blends. Higher costs for granular or pelleted fertilizers may be justified, he said, in order to obtain a balanced distribution of nutrients with spinner-type spreaders.

Homeowners should look for discounts during early season sales campaigns or late in the season. Above all, have the soil tested to determine the need for nutrients.

Turf professionals using large amounts of fertilizer should continue buying bulk supplies, where savings are generally available. Some suppliers will deliver in portable bins if storage space is not available.

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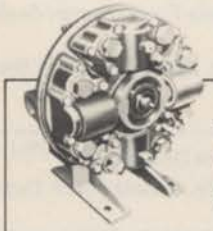

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Missouri Distributor Moves Into 44,000-Sq.-Ft. Building

Robison's Lawn & Golf, Inc., a 30-year-old professional turf maintenance equipment and golf car distributorship, has moved into a remodeled 44,000-square-foot building in Grandview, Mo.

The building is on five acres and serves as Robison's sales and service outlet throughout Kansas and western Missouri. William E. Robison, Jr. and Jack W. Robison co-own the 23-member distributorship which handles RainBird sprinkler systems and Cushman golf cars and turf care equipment.

Hesston's Production Tripled By Move to Larger Facility

The Lawn Equipment Division of Hesston Corporation recently tripled its production capacity and office space by moving its headquarters to a two-year-old building in southeast Indianapolis.

According to Bill Howard, division general manager, the move to the 54,000 square foot facility makes it possible to streamline the division's manufacturing process. The Front Runner grounds maintenance tractor, its attachments and the newly-designed StumpRazor tree stump remover can now be produced simultaneously, increasing the division's ability to fill distributor and dealer orders.

"The move also improves the working conditions of Lawn Equip-

(continued)

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The old saying that beauty is more than skin-deep is nowhere more applicable than on a golf course. Beautiful turf will not retain its beauty unless it remains healthy. In addition to normal wear and tear from golf play and stress from variable weather conditions, fungi are an ever-present health threat to turf. There's little you can do about golf play and weather, but you can control fungal diseases. An effective, economical way to combat fungal growth all year long is to use Acti-dione® Thiram and Acti-dione TGF® in a four-season disease control program. With fungi out of the way, turf has a better chance to grow strong and healthy — to resist weed infestation, to bounce back from injury and to survive adverse weather conditions. See your TUCO distributor today for complete information and assistance in planning a four-season disease control program with Acti-dione turf fungicides.

In Spring, watch out for Leaf Spot

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ment Division employees and will enable the manufacturing department to reach its desired efficiency objective. The improved efficiencies should result in better quality control, the expanded production of higher quality products at competitive prices and the addition of several new product lines.

"Added space for advanced engineering, research and development is another benefit of the move. A drafting department and indoor field test stand have been added, giving the division a greater capacity to develop new and innovative grounds maintenance equipment," Howard said.

"The Hesston Lawn Equipment Division also has added a well-equipped fabrication shop which further improved quality control and eliminated long lead times of formerly purchased parts. Warehouse facilities have been consolidated and the service parts department has been greatly expanded, resulting in the increased efficiency of shipping and receiving," Howard said.

(more news on page 64)

This new Hesston Lawn Equipment Division facility more than triples the division's production capacity and office space.

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People on the Move

Diamond Shamrock Corp. announced the following organization changes: **W. H. Bricker,** elected president and will continue as Chief operating officer; **C. A. Cash,** elected chairman of the board succeeding **James A. Hughes,** who was elected chairman, finance committee.

* * *

Ken Weill, appointed service development manager, Jacobsen Manufacturing Co. **Phil Taylor** promoted to service manager, turf products, replacing Weill.

* * *

J. Paul Blake, appointed manager of public relations, The Toro Co.

* * *

Dr. Paul Alexander, named chief agronomist for Goltra, Inc., subisdary of the C. B. Dolge, Co.

* * *

F. Leon Herron, Jr., appointed chairman and chief executive officer, O. M. Scott & Sons Co.; **Maurice Decoster,** became Scott's president and chief operating officer.

* * *

K. Thomas Bloom, appointed director of manufacturing for chlor-alkali and consumer products operations of the Chemicals Group of Olin Corp.

* * *

Ted I. Axland, named U.S. sales manager, Gulf Crop Protection Products Dept., Gulf Oil Chemicals Co.

* * *

Sam H. Patmon, appointed Pacific Southwest sales manager for Weather-matic Irrigation, Telsco Industries.

* * *

Agricultural Chemicals Div. of ICI United States, Inc. announced three appointments: **Janice Rudolph,** technical literature coordinator; **Roger Couture,** plant physiologist; **Charles Shirar,** technical sales representative.

* * *

Rodney Tochihara, appointed territory sales manager, Cal-Turf, Inc., for the Los Angeles area.

* * *

Paul S. Murphy, joined Freeport Minerals Co. as assistant to the vice president, corporate development.

* * *

Dr. Richard C. Back, appointed corporate development fellow of Union Carbide Corp. in recognition of his technical achievements.

* * *

J I Case announced corporate promotions: **Edward J. Campbell,** group vice president, North America; **Jerome K. Green,** senior vice president, finance and corporate planning; **James J. Gill,** vice president and general manager, Agricultural Equipment Div.; **David H. Abbott,** vice president and general manager, Construction Equipment Div.

* * *

Albert D. Epperly, named manager of U.S. chemical industry sales for The Foxboro Co.

* * *

James C. Hendricks, appointed vice president, marketing and sales, M-B Corp.

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NEWS *(continued)*

ProTurf Introduces Blends For Winter Overseeding Use

The ProTurf Division of O. M. Scott & Sons, headquartered in Marysville, Ohio, has introduced two new seed blends specially designed for use in winter overseeding. The announcement was made by Dick Spitler, ProTurf's southern regional manager.

According to Spitler, the new blends are named WinterGreen I and WinterGreen II. WinterGreen I is a blend of Manhattan and Pennfine perennial ryegrasses and Victa Kentucky bluegrass. WinterGreen II is a blend of Highlight fescue, *Poa trivialis* and Seaside bentgrass. Both blends are reported to be better than 99.9 percent weed-free.

Spitler said the new overseeding blends were developed and tested at Scotts' two southern research field stations (in Florida and Texas) and on several golf courses throughout the South. Both blends are available through ProTurf technical representatives in the South.

Missouri Foresters Studying Causes of Wood Separation

Foresters in Columbia, Mo., are looking "inside" wood to see if they can eliminate some of those defects that might "shake" Missouri's walnut prominence.

"Shake" is the word given to those separations in wood caused by anything in the tree's environment from a logging injury to an overzealous sapsucker. And they can be quite serious, since Missouri ranks first in the nation in walnut lumber, production of walnut gunstocks, the processing of walnut meats, and the growing of young walnut trees. The state also ranks high in the production of walnut novelties and veneer.

To discover the cause and cure of walnut defects, University of Missouri-Columbia (UMC) scientists now have their own drying kiln on campus in which over 1,000 potential gunstocks (blanks) are being monitored.

A "blank" is a piece of wood cut in the general shape of a gunstock. It is about three inches thick and its ends have been dipped in wax so they don't dry out faster than the rest of the blank in the kiln where they are seasoned for up to six months.

"If we can identify the cause of the checks and shakes in the wood, we should be able to improve walnut quality," said E. Allen McGinnes, UMC forestry researcher.

"For example, some of the defects may be coming from poor soil quality. If that's the case, we could amend the soil or otherwise change it to correct the problem," he said.

McGinnes and John Phelps, research associate, are also examining the fundamental properties of the walnut to see why it behaves the way it does.

"Wood separation occurs in living trees," said Phelps. "It's usually caused by some sort of injury."

The unknowing "culprits" are often loggers, hunters and birds. Of the birds, the sapsucker would probably be rated public enemy number one because of its fondness for sap and insects on walnut trees.

To study wood damage, Phelps soaks the wood in boiling water to soften it. Then he cuts an area

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around the shake and looks at it under a microscope. Using different stains to enhance the cellulose and lignin in the wood so he can see things better, Phelps magnifies wood cells up to 2,000 times to learn the difference between normal and abnormal cells.

"Once we learn the cause of these abnormalities," he said, "we'll be able to suggest preventive measures, in logging, for example."

McGinnes said the UMC research could have a big impact on the Missouri walnut industry. "Everyone gains when we can keep walnut trees in shape," he said. "That eliminates a lot of waste and faulty products."

It could even mean more veneer trees — the ones that make a perfect log that can be thinly sliced and used for fine-crafted furniture.

"Everyone hopes he has one of those valuable trees in his backyard," McGinnes said. "The truth is, though, there are a lot more $10 trees than there are $10,000 ones."

FMC Division To Sponsor Display Contest for Dealers

FMC Corporation's Outdoor Power Equipment Division, located in Port Washington, Wis., has announced plans for a dealer display contest for the 1975 selling season. The division manufactures the Bolens line of lawn and garden equipment.

To be eligible for the contest, dealers must display a minimum of five 1975 Bolens products. The dealers will be using materials available from the division. Judging for the contest will be done by an independent agency during a period from April 1 to June 1.

Participating North American dealers will be competing for awards for the most attractive, informative and effective displays of Bolens products. Over $5,000 in prizes will be awarded, and all participants will receive a set of Bolens glassware.

New Publication Announced By Shade Tree Conference

Green Industry treemen now have a new publication available to them — the *Journal of Arboriculture.*

Published by the International Shade Tree Conference (ISTC), the monthly Journal will contain educational, technical and scientific papers of value to those who select, establish and maintain shade and ornamental trees.

The ISTC is not new to the field of publishing arboricultural information. They have published *Arborist's News* for 458 consecutive months and the proceedings of their annual meeting for 45 consecutive years. Both of these publications are replaced by the *Journal of Arboriculture.*

The Journal is available by subscription to individuals or libraries. Interested in obtaining the magazine? Contact E. C. Bundy, ISTC, P.O. Box 71, Urbana, Ill. 61801.

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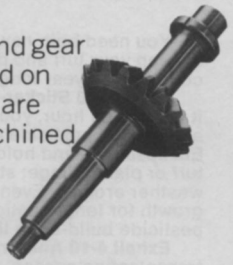

The gears and gear box shafts used on our machines are precision machined to increase strength and durability, and reduce noise.

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Of course, this is only part of our story. The point is that Servis builds a complete line of equipment with one simple idea in mind. To be the best.

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For more information about the Servis line, contact your nearest authorized Servis dealer, or write: Austin Products, Inc. Dept. 2-75 S, P.O. Box 1590, Dallas, Texas 75221.

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ment than can be offered in large organizations. Employees may be trained in a profession rather than for a specific job. It can enhance an employee's self-esteem and develop pride in work performance — a satisfaction seldom achieved by employees in organizations.

The effect of training programs on the ego and creative needs of employees is immeasurable. Training not only provides employees with a greater creative potential, it will enable them to better direct and articulate their present capabilities. If the training can be offered in a social context, (conferences, seminars, etc.), the social need of employees will be enhanced. To many employees, a training program is management's way of investing in the future of both the employee and the organization, and it integrates the goals of both the organization and its people.

There are a variety of training programs, techniques and methods. Management should evaluate and choose those that will provide the greatest benefit to the organization and its people.

Performance Evaluation

In all organizations, public and private, some form of reward should be available for distribution to employees. If the company is achieving any degree of success in its annual operation, employees should share in the success. Management should try to reward employees for past performance and to provide an incentive for future performance.

An increase in salary or fringe benefits will satisfy the physiological and safety needs of emplyees and may be important as ego need satisfiers. For the employee monetary and non-monetary recognition for effort does much for both aspects of the ego need.

In every salary increase management should inject and publicize some element of rewards based on merit (individual contributions to the achievement of organizational objectives). However, there may be times when the dollar amounts devoted to merit should be balanced with other factors. During the past five years inflation has erroded the real income of employees. If amounts available for distribution in salary increments are sufficient, workers should be give a cost-of-living increment and, if available, a portion set aside for merit increases. The publicizing of individual merit performance may be as important to some individuals as the dollar increase itself. However, for others a quiet, non-publicized word of appreciation may outweigh the money value of a salary increment. It is so common in organizations for management not to tell their subordinates that they are doing well that an employee could be with a firm for years and never know if his contribution is considered adequate or appreciated.

If funds are not available for salary increments, non-monetary rewards should be used to recognize individual and collective performance. There are many rewards that should be considered. Rewards that

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will satisfy the social, ego and creative needs of employees. For example, there may be no substitute for a simple pat on the back and a sincere word of appreciation for a job well done.

Status Symbols

Status symbols are evidence of man's ego need in the organization. So important are these seemingly unimportant things that they should be carefully determined and considered. I have seen highly educated and responsible executives literally worry themselves sick over their status because an administrative peer in another department may have four square feet more of office space, rugs on his floor, windows on two sides of his office, or newer office furniture. I have observed officials in high and low positions pull strings, apply pressure, deviously plan, cojole, beg and threaten others in an attempt to receive a more favorable office location, better equipment, a reserved parking space, a certain secretary, a higher place in the organizational pecking order, a rewrite of their position descriptions to reflect a greater importance of their position, mahogany desk (versus metal) and many other seemingly insignificant things. But insignificant they aren't, for they reflect the reputation and influence of the manager in the organization.

Lest the reader misunderstand, the author does not ridicule or discourage the striving of organization personnel to acquire status symbols. Quite the contrary, these status symbols are a part of the things we aspire for in every organization. They are the little things that we feel enhance our reputations in the organization and hope that others recognize our importance for acquiring them. To eliminate them or reduce their importance as unnecessary or undesirable is to prevent the employee from achieving his aspirations. Certainly their importance can be over-emphasized but properly used they can become strong motivating factors and non-

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Fitzsimons on CERTIFIED Manhattan

Pat Fitzsimons, in winning the Glen Campbell Los Angeles Open at Riviera CC, Calif., Feb. 20-23, set a new course record of 64 for a single round and tied Ben Hogan's record for this event. Fitz, above, tees off on the No. 1 Manhattan tee at Salem Golf Club course, Salem, Ore., where he previously tied the world record score of 58 on a 6,000 yard course.

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monetary need satisfiers in the organization environment.

For small firms without facilities or funds to provide costly status symbols there are other little techniques that can be used. For example, job titles are important to people regardless of position in the firm. With job titles management can provide considerable status while establishing opportunity for progression in the organization. This can be done by written job classifications within jobs that will provide the aspiring employee with opportunity to advance in the organization. Also, as he progresses the job class title that he holds gives him ego satisfaction in the form of a talking point with friends in and out of the organization. Titles of jobs are important to the holder.

Another set of status symbols may relate to the claims on certain company resources or areas by employees. On certain jobs it may be an office, uniform, a personal locker, employee shower baths, parking spaces, tool chests or tool lockers, a piece of equipment or a building. This may be a part of the so-called territorial instinct of man to hold, protect and acquire security and status in one's territory or property.

Along with the above, management should consider the effect on the social and ego needs of employees that pleasant eating facilities, restrooms and lounges may have on employees. The social need satisfactions of employees may be enhanced if better facilities are provided in which to socialize. The author has known many employees, managerial and non-managerial, whose major complaint about the company was the lack of adequate or clean facilities in which to eat and socialize.

As it pertains to social need satisfactions, certain employees may be encouraged with little prodding to institute certain activities of a social nature on and off the job. Some employees derive considerable ego, social and creative need satisfactions by planning and organizing small birthday and anniversary parties, in addition to other events such as marriages, births, promotions, departures, holidays, deaths and emergencies. Management should avoid forcing participation by employees in company parties or events on or off the job. Nevertheless employees may be encouraged to establish a rapport that is conducive to the "happy family" syndrome. They are a happy family and they not only have fun but they take care of each other.

The reader should recognize that any or all of the social event type of activities may not be successful in some environments. The success of any motivational technique is dependent upon how well management is providing over-all need satisfaction in the work environment. In addition, it is possible that many mangement motivational techniques will not be successful simply because of the manner in which management offered them. A paternalistic or "big daddy" approach by management should be avoided for it turns employees off. The author has known and observed many work environments in which the attitudes and feelings of both management and employees toward each other were so negative that no single positive act on the part of either would change those negative attitudes. Only time and a positive attitude will eliminate or reduce the negativeness and suspicion that may

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exist between the management and non-management personnel.

In the three brief articles, the author has tried to emphasize several points relating to the understanding and motivation of employees. First, managers should recognize that there are no easy steps to motivation. To motivate people we must have a thorough understanding of the goals that employees carry into the work environment. Managers and non-managerial employees have formulated many misleading and common attitudes toward each other and some of these are very negative. These negative attitudes influence their decisions and generate negative reactions from those affected by the decisions.

Second, we are all goal achievers and establish goals in every environment in which we operate, including the work environment. The goals we establish provide us with direction, guidance, continuity and consistency in life.

Third, the major importance of the goals we establish is that their achievement will result in the satisfaction of one or more needs. It is the needs of man that we must thoroughly understand if we are to acquire a knowledge of what must be done to motivate employees in the work environment. It is a lack of understanding of the need structure of man that creates most human problems in organizations. Many employees are demotivated inadvertently by managers.

Fourth, with a better understanding of the goal/needs concept of human behavior, the author recommended the use of certain motivational techniques that should result in establishing a more positive work climate. It was not the intent of the author to provide or suggest specific motivational methods as it was to make the reader more aware of the type of thinking that should prevail in considering the needs of employees in the environment.

Fifth, the author tried to impart the idea of the importance of people as a resource in the organization. The success of any organization is completely dependent upont its people. The success of any manager is dependent upon his subordinates. From the experiences of the author in organizations (public and private, large and small), managers are not acquiring the best possible utilization of their people resource in the achievement of organizational objectives. People in the organization are not being motivated to achieve organizational objectives. And the greatest waste in our society stems from management's failure to understand and motivate the human resource. □

[1]The Human Side of Enterprise, Douglas McGregor, McGraw-Hill Book Company, New York, New York, 1960.

THIS POWER MACHINE AERATES AND PRECISION-DISPENSES THREE TURF MATERIALS SIMULTANEOUSLY.

seed, fertilizer, controls, etc.

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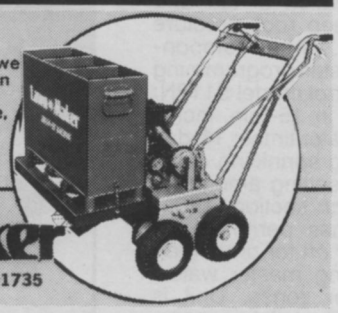

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New Products

COMPRESSED AIR SPRAYERS: Lightweight sprayers from D. B. Smith and Co., Inc., have tanks and pumps formed from polyethylene and nylon. Corrosion-proof sprayers are lighter than metal tanks of same capacities and are said to be easy to fill and non-spillable. Features include no-drip trigger and handle with thumb release and lock for long spray jobs, cone spray nozzle with stainless disc for long wear, easy disassembly, extra-long PVC hose and wide heavy-duty shoulder strap option. Tank capacities for models (in actual gallons) are: P4, 1 gal.; P6, 1½ gal.; P12, 3 gal.

Circle No. 701 on the reply card.

12RC SPRAYER: FMC Corp.'s new model 12RC air carrier sprayer for golf courses is built with same features as 10 RCTR air carrier sprayer but has a Bean 20 gpm pump instead of a 10 gpm capacity allowing greater spraying speed. Sprayer covers 40 to 45 feet without driving over playing surfaces allowing spray of most fairways in two passes. Can also be used for leaf blowing and greens drying. Bean 12RC features stainless steel tank and piping, complete pto powering and rotating air head.

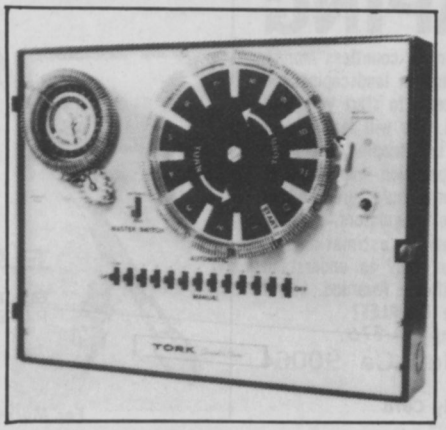
Circle No. 702 on the reply card.

POWER PACK: A portable power pack for operating hydraulic pruners, circular saws and chain saws has been introduced by Causco, Inc. Compact, 8 hp gasoline engine powered unit is completely self-contained and is mounted on wheels to it can be handled by one man. In addition to hydraulic pump and 10 gal. oil reservoir, unit also includes oil cooler to keep oil from overheating and selector valve which permits changing tools without shutting off power plant. Dimensions: 37 in. L x 36½ in. W x 26½ in. H; dry wt. — 125 lbs. Power pack can be used with any tool designed to operate on an open-center hydraulic system.

Circle No. 703 on the reply card.

SPRINKLER CONTROL: A 12-zone lawn sprinkler control, introduced by Tork Time Controls, Inc., is designed to provide uniform saturation of turf and shrubs to promote deep root structure without wasting water. Three components comprise the master programming on fully automatic control model 5112N: 24-hour dial, settable in 15-min. increments for on and off water times; 14-day selector dial for setting sprinkling days; and 12-zone dial for setting amount of sprinkling time for each section. 12 individual circuit switches permit maintaining any zone on or off for prolonged periods without altering master watering program or other zones. Unit is housed in an indoor installation case, 15⅜ x 12⅛ x 4½ inches. Lockable weatherproof case for outdoors is available.

Circle No. 704 on the reply card.



FLAIL MOWER: Gravely has introduced a new flail mower for their line of two-wheel convertible tractors. The mower is made of heavy steel with welded reinforced housing; mower has 88 freeswinging blades and can be easily reversed. Dimensions: 37½ in. W x 17 in. H x 25¼ in. L; mows a 32-in. swath. Front caster wheels help eliminate scalping smooth lawns. Mower is reported to be easy to attach and remove.

Circle No. 705 on the reply card.

RAINDROP™ NOZZLE: In Delavan Manufacturing Co.'s concept of low-drift spraying, no additives are required. The nozzle design alone is reported to produce a spray pattern with droplets that are significantly larger and more uniform than those produced by conventional nozzles at comparable pressures and flow rates, resulting in few driftable fines (droplets under 100 microns). Raindrop ™ is said to adapt easily to conventional spray booms, either ground or aerial. Raindrop™ was selected by Industrial Research magazine as one of the 100 most significant new product developments last year.

Circle No. 706 on the reply card.

LIQUID FERTILIZER: Liqua-Form® 14-7-4 LC/40% Organic, liquid fertilizer containing slow-release nitrogen, is now available from Plant Food Chemicals Co. in 50 lb. (5 gal.) containers. Liqua-Form® is a fluid suspension fertilizer, containing soluble nitrogen, partly-soluble synthetic organic slow-release nitrogen, ortho- and poly-phosphates, potassium of low salt and chlorine content and traces of minor elements. Suspension contains fine urea formaldehyde water-insoluble nitrogen particles which are converted by soil bacteria to soluble nitrates usable by the plant. Best results are said to be obtained by probe injection into the root area. Surface application can be made on light to medium soils.

Circle No. 707 on the reply card.

Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

Rates: All classifications 50¢ per word. Box number, $1. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

FOR SALE

ARPS stump cutter teeth, top quality and best price in U.S.A., D. J. Andrews, Inc., 17 Silver St., Rochester, New York 14611. Call 716 235-1230.

SURPLUS HOSE: PVC spray hose — Bulk or coupled; cut to order; 800 PSI working pressure. Prices — ⅜" I.D. $.30 ft., ½" I.D. $.40 ft., ¾" I.D. $.50 ft. PVC air and water hose — Bulk or coupled; cut to order; working pressures to 250 PSI. Prices — ¼" I.D. $.10 ft., ⅜" I.D. $.18 ft., ½" I.D. $.22 ft., ¾" I.D. $.30 ft. Coupled — Add $7.00 per assembly. Turfco Incorporated, P.O. Box 971, Glenwood Springs, Colorado 81601.

MISCELLANEOUS

TREE APPRAISALS, Surveys, loss evaluations and expert consultation services. For names of members of the American Society of Consulting Arborists, Inc., throughout the country, contact: Executive Director ASCA, 12 Lakeview Ave., Milltown, New Jersey 08850.

PUGET SOUND TREE SERVICE, INC., 1111 No. 98th St., Seattle, Washington 98103, Stump Chipper Teeth and pockets for the Northwest. Phone 206 523-2240.

POSITION WANTED

GROUNDSMEN, GARDENERS, TREE TRIMMERS: Two year vocational graduates in Golf Course Management, Grounds Maintenance and Arboriculture desire positions with private and public horticultural services departments. Willing to locate nationally. For additional information, contact E. L. Viramontes, Instructor, Landscape Career Center, Box 191, Anoka, Minn. 55303 — 612 427-1586.

HORTICULTURIST: Seeking managerial or sales position, diversified experience, adaptable, challenges welcomed. Reply Box 128, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

EDUCATION-BOOKS

AUTOMATIC IRRIGATION COURSE Sprinkler heads, remote control valves, controllers, vacuum breakers, precipitation rates, etc. all variations covered. System design, installation, operation, maintenance. Send for free course out-line. Larson Company, P.O. Box 4453, Santa Barbara, Ca. 93103.

SEEDS

SOD QUALITY Seeds Merion, Fylking, Delta, Park, Newport, Nugget, Adelphi, Cheri, Glade and Baron bluegrasses also fine fescues. Manhattan rye grass. Custom mixing available. Michigan State Seed Co., Grand Ledge, Michigan 48837. Phone 517 627-2164.

USED EQUIPMENT

FOR SALE white tandem with Prentice log loader, bunks, and 10 ft. snow plow. 1968 G.M.C. 7500 17 yd. dump with 11 ft. power angle plow. 1971 Chevy. ¾ ton 4 W.D. pickup, new 8 ft. Fisher plow. 1965 International T.C. 5 bulldozer, winch, blade, and cab. Model 10 Vermeer stump cutter. 1968 Fitchburg chipper 16 in. V8 powered 6 ton deck over trailer. One buyer take all. Phone 413 786-0522. Gregory Nowhill, P.O. Box 27, Feeding Hills, Mass. 01030.

1970 F-600 FORD 52' Hi-Ranger with chip box, $18,500.00; 1971 Woodchuck brush chipper, 4 cylinder, 12", $2900.00; 1967 Chevy stake with 1968 John Bean 35GPM sprayer, $6000.00; 1972 Fleco 26" tree shear, $4500.00. Jim Green, Ohio Chipper & Equipment Company, Div. of Osborne Brothers Tree Service, Mentor, Ohio 216 951-4355.

BEAN ROTO-MIST-100, like new, under 100 hours. 300 gallon stainless steel tank, only $5,500. Cheshire Tree Service, Cheshire, Conn. 06410. Phone 203 272-0391.

VERMEER STUMP CUTTER, model 10, excellent condition, new engine, $3,500.00, Shearer Tree Surgeons, 300 Basin Rd., Trenton, New Jersey 08619. Phone 609 924-2800.

STUMP grinder log splitters, chippers, sprayers, bucket trucks, all reconditioned; let us know your needs, Essco, 5620 Old Sunrise Highway, Masspequa, New York 11758. Phone 516 799-7619.

WANTED Finn hydro seeder. Briggs Turf Farm, Box 3, Stilwell, Kansas 66085. Phone 913 681-2384.

VERMEER TREE SPADES TS-30, TS-44T, TS-66T. Phone 817 469-8943.

HELP WANTED

DISTRIBUTORS for D. J. Andrews, Inc. stump cutter teeth, pockets and bolts. Best wholesale and retail price in U.S.A. Add to this exclusive area, local advertising at our expense, etc., and you have our story. D. J. Andrews, Inc., 17 Silver St., Rochester, N.Y. 14611. Call 716 235-1230, or 716 436-1515.

PROFESSIONAL POSITION OPEN — Landscape design and sales, must be college trained and at least 5 years experience in the residential and light commercial field. Excellent opportunity for the aggressive person. Will match your existing salary plus more if you qualify. Contact F. R. Micha, Monroe Tree & Landscape, Inc., 225 Ballantyne Road, Rochester, New York 14623

MAN TO WORK AND MANAGE all phases of tree and spray business in Michigan. Salary open. Please send resume, salary requirements, and any questions to Box 129, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

MANAGERS—Sod Farm and or Vegetable Crops — Long Island and south New Jersey area. Must qualify to manage all aspects of production. Farms of several hundred acres. Personnel management, general agriculture experience and knowledge of farm equipment will be of primary consideration. Health Insurance, Profit Sharing and other Benefits. Salary open. Reply: Box 130, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

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Trimmings

The Horticultural Research Institute is inviting any organization conducting research beneficial to the nursery industry to apply for one of a number of $500 Richard P. White grants. Recipients are selected from information provided on a questionnaire. Application questionnaires are available from the Institute at 230 Southern Building, Washington, D. C. 20005. Applications must be submitted prior to May 1.

The dynamic duo of Train and Butz recently signed an interagency cooperative agreement calling for Federal, State and local cooperation in the training and certification of pesticides applicators. Russell E. Train, EPA head, said the agreement will provide guidelines for development of applicator training programs. Butz pledged his Extension Service's assistance in implementing training programs.

University of Missouri-Columbia Forestry Researcher, Tom Hinkley, is studying tree behavior. One of Hinkley's favorite projects is recording the shrinkage and swelling of tree trunks. He says the shrinkage occurs every warm day when stems are their fattest around 8 a.m. and slimmest around 3-4 p.m., the hottest part of the day. Hinkley is making extensive studies of tree behavior under environmental conditions. He feeds this information into a computer with hopes of being able to simulate tree growth and anticipate tree behavior.

Rice isn't the only thing shot from cannons. It seems some Australians are using a cannon primed with hay, fertilizer, bitumen and grass seed as a type of hydromulching process and converting barren landscape into grassed areas. The bituminized bombshell explodes in a spray over the target area. Within an hour the mixture sets, glueing it firmly to the ground. Each coating is usually from 4-6 inches thick.

One way to fight inflation, says OSHA boss, John Stender, is to maintain safe and healthful conditions for American workers. Stender said that by working together to enforce federal and state job safety regulations "we can put the lid on inflation by holding down costs that accompany an unsafe or unhealthy work situation."

Forest Service is sponsoring a spring symposium on the possible problem of rising levels of acidity in rain, snow and hail. Acid precipitation is believed to be caused by air pollution associated with burning of fossil fuels. All aspects of acid precipitation and its possible effects on the forest ecosystem including atmospheric transport and chemistry, forest vegetation, soil environment and water resources and hydrology, will be considered. Additional information can be obtained from Dr. Leon Dochinger at the U. S. Forest Service Laboratories, P.O. Box 365, Delaware, Ohio 43015.

National Obsolete Parts Program, a service designed to locate discontinued Jacobsen parts, is in full swing. The equipment owner need only contact the factory where a listing of obsolete parts is recorded and the parts location becomes available in seconds. The program will: move dealer and distributor parts stocks by sale not scrap; help keeep older products performing efficiently longer and reinforce the company reputation for quality and service with the general public.

The Fertilizer Institute has published a new information package entitled "The Fertilizer Crunch." The booklet explains facts behind the current fertilizer supply situation and outlines steps to manage during the shortage. Also available is a supplementary 25 slide set. For order form and price list contact: Publication Service, The Fertilizer Institute, 1015 18th St., N.W., Washington, D. C. 20036.

Happy birthday to US. One of the many ways our nation will be celebrating its bicentennial is by community park and recreational area projects. The green area projects are becoming increasingly popular throughout the country and seems a most appropriate means of observing the birth of our nation.

The Fertilizer Institute's turf and garden committee put wheels in motion to utilize a lawn and garden writer for emphasizing environmental benefits of turf fertilization.

One group of concerned citizens in Eastern Pennsylvania successfully curbed an invasion of gypsy moths in 1974 using one of the popular formulations of Bacillus thuringiensis. The project was so successful and well organized that Sandoz, Inc. has produced a full-color booklet entitled "The Gulph Mills Story" describing in detail how the city of Gulph Mills saved their trees from a moth invasion. Other communities or interested groups can receive a free copy by writing: Sandoz, Inc., Dept. G, P.O. Box 1489, Homestead, Florida 33030.

An herbicide "hot line" has been opened on a year around basis by Velsicol Chemical Co. The company decided to expand the facility after having received and answered over 1,500 calls during a trial four month period in 1974. An experienced company representative mans the phone during regular business hours answering questions and providing information. After hours calls are automatically tape recorded and answered by mail or return telephone call within 48 hours. Velsicol is attempting to answer all inquiries by drawing on a variety of information sources including extension service recommendations from each state in the U. S. as well as product labels from many other competing firms. For more information contact: Velsicol Chemical Co., 341 E. Ohio, Chicago, Ill. 60611. The toll free number is 800-621-4129.

Remember the famous old Turf King?

Just like the rest of us Jacobsen Distributors, Al Van Pelt of the Boyd Martin Company in Salt Lake City, Utah has fond memories of the 76" and 84" Turf Kings.

They were workhorse mowers in the turf world. But now they've become a memory with the introduction of the new, improved models.

First off, they've been completely redesigned. Look at the sharp styling. It's your first hint of all new features that are aimed at making the old leaders the new leaders.

The variable speed drive has been replaced with a hydrostatic drive that's better. The transport speed has been increased to over 8 MPH.

The old handle bars are gone. You'll find a sleek new steering wheel instead because it makes turning easier and offers more control.

The rope starter has been replaced by recoil starting right from the driver's seat. Speaking of the driver's seat, you'll notice it's now high-backed for firmer support. And it's even more comfortable. The gas tank is bigger for fewer fuel stops.

There are some things that were too good to change, so we didn't.

The Turf Kings can still cut their way through 30 acres in a day. With beautiful results. The mowers are fully articulated to follow the dips and slopes of uneven ground.

And the constant speed reels put a consistently fine and smooth finish to any turf.

You'd better talk to your Jacobsen Distributor about these new three-reelers. A simple demonstration will make you forget all about any second best equipment.

Even our old Turf Kings.

Your Jacobsen Distributors.

Before we sell it, we buy it.

For the name of the distributor near you write: Jacobsen Turf Distributor Directory, 1721 Packard Avenue, Racine, Wisconsin 53403.

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"In Canada, it normally takes two years to raise a sod crop, but with baron,* it takes only one. That means twice as much profit."

"It has been my experience that baron requires less fertilizer than other bluegrass. And, at today's price of fertilizer, that's important to me!"

*U.S. Plant Patent #3186 Dwarf Variety

"During the winter of 1973-74 there was a lot of ice and was followed by 20° below zero temperatures. I lost some of my sod crop, but I lost less than sod farmers who didn't use Baron."

"I've always been proud of my sod, but since I've been using Baron, I've got even more reason to be proud because Baron is #1. I've been using a Baron Kentucky Bluegrass mixture on every acre of sod I grow, and I'll use Baron on every acre next year, too."

"Baron stays greener in the fall and greens up earlier in the spring than other bluegrass. And, it's heartier, too. I've never lost a roll of Baron sod during loading, carrying and unloading. The root system with Baron makes twice as many roots as other varieties."

"The summer of 1974 was extremely dry. But Baron proved that it's very resistant to drought. With Baron I didn't have any problem with disease. . .and I found Baron Kentucky Bluegrass to be weed free. That's important to me."

"Since I've been using Baron, too many people want my sod. . .I don't have enough. See my name on this old truck? That's all the publicity I need. A good producer doesn't need any more. When I say my sod has Baron in its mixture, people know I'm a good producer."

Jean Paul Lauzon has been growing sod for 27 years and is considered by many to be Canada's best.

There's not much more we can add to Jean Paul's comments except that Lofts Pedigreed Seed, Inc. or any authorized distributor is ready to serve your needs wherever you grow sod.

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